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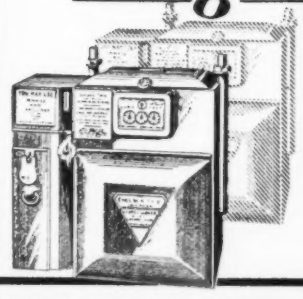

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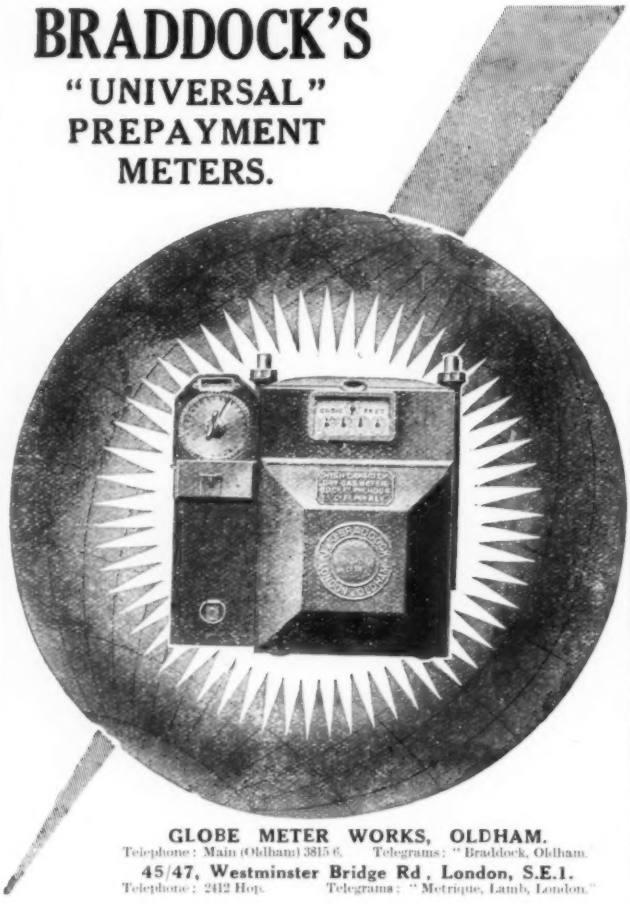

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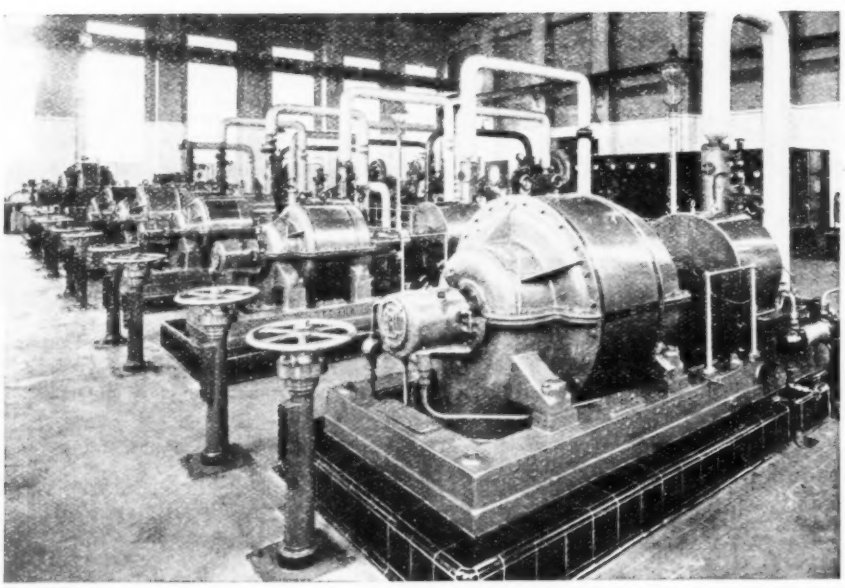

Fig. 828.

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CONTENTS

EDITORIAL NOTES.

A GLANCE AT THE CONTENTS . . . 797
Rubber Jointing Rings 798
Thermal Insulation 798
Disfiguring the Landscape 798
Coal *v.* Oil 799
Domestic Oil Competition 799
Australian Statistics 799

The "Gas Salesman" 797
Forthcoming Engagements 797
1933 "JOURNAL" Directory 797
Personal 800
Obituary 800

NEWS OF THE WEEK.

Paragraphs 800
Gas-Driven 'Bus Experiments in Newcastle . 800
Leeds Training and the Gas Industry . . 800
Gas Exhibition at Oldham 801
Explosion at Gateshead 801
New Scale of Charges at Oxford 801
A Margate Exhibition 801
Gas Light and Coke Company Bill . . . 801
A Dickens' Dramatic Recital 802
Gas as a Motor Fuel 802
North British Association of Gas Managers . 802

NEWS OF THE WEEK—(*continued*).

Yorkshire and Lancashire Juniors Visit York 802
Engineers and the Sea-Going Fraternity . . 803
Midland Juniors Visit Chesterfield . . . 803
Glover-West Vertical Retorts in Hand . . 803

SPECIAL ARTICLES, &c.

Floodlighting of Building Estates. By R. S. Ross 804
Notes on Plant and Processes 805
New Plant at Clacton-on-Sea 806
Rubber Joints in Gas Mains 809
Continental Notes 810
New Showrooms at Rayleigh—Gas Light and Coke Company's Service in Essex . . . 811
Plymouth Make a Big "K.C.U." Effort . . 812
The Mechanism of Coke Formation. By Dr. G. E. Foxwell 813

"JOURNAL" TECHNICAL RECORD.

London and Southern District Junior Gas Association—
Theoretical Aspects of Benzole Recovery from Coal Gas. By C. M. Wearing . . 814
Australian Gas Institute—
Presidential Address of Mr. S. J. Janes . 818

MISCELLANEOUS.

European Gas Company, Ltd.—Annual General Meeting 820
Reports from Overseas—
Metropolitan Gas Company of Melbourne 822
Wellington (New Zealand) Gas Company, Ltd. 822
Maryborough Gas and Coke Company, Ltd. (Queensland) 822
Auckland Gas Company 822
British Gas Light Company, Ltd. 823
Gas Companies' Results in 1932 824
Parliamentary Intelligence 826
Gas Acts (1920 and 1929) Orders 826

LEGAL INTELLIGENCE.

Infringement of "Coalite" Trade Mark . . 825

GAS MARKETS AND MANUFACTURES.

Stock Market Report 826
Current Sales of Gas Products 826

Stock and Share List 827

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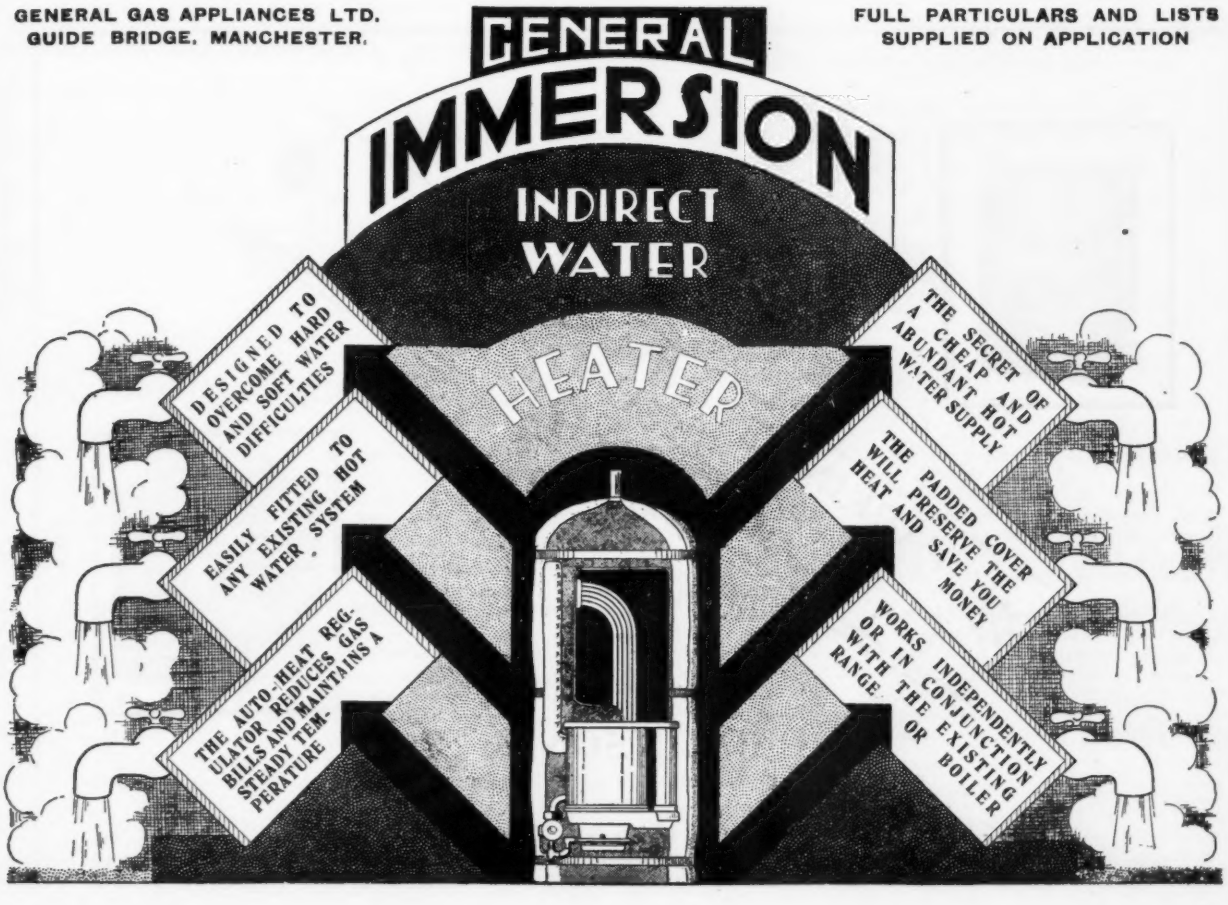
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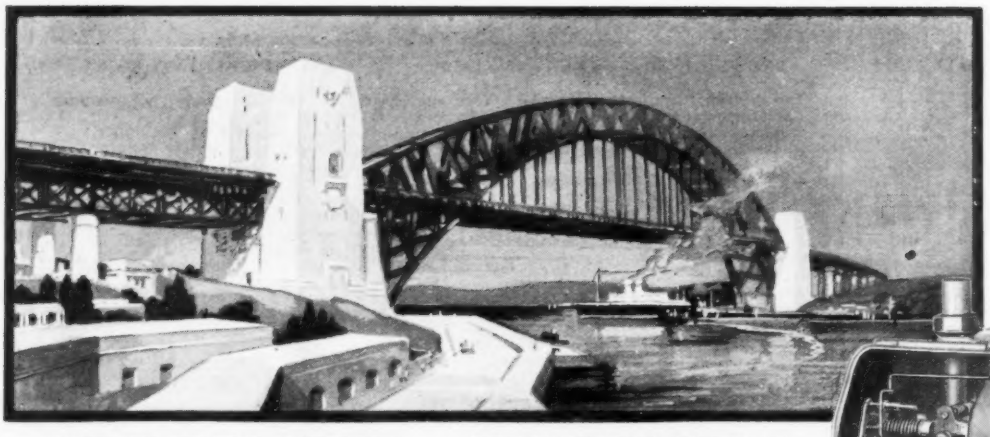

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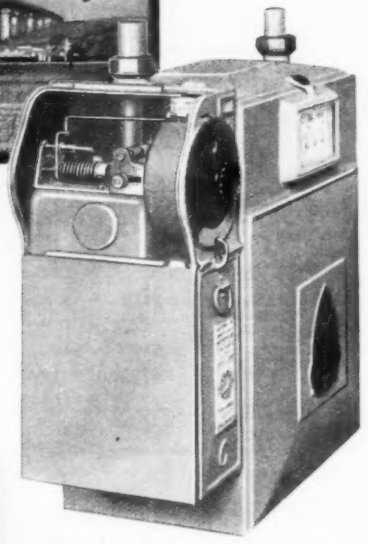

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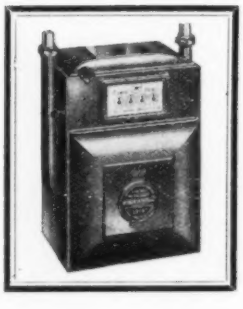

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THE GAS JOURNAL

MARCH 29, 1933

Vol. 201. 85th Year No. 3645

A Glance at the Contents—

Floodlighting Building Estates.

Photographs show that the floodlighting by gas of building estates is an excellent means of publicity. [p. 804.]

Distribution Superintendent Required.

Applications are invited for the position of Distribution Superintendent to a Gas Company in the West of England. [p. 830.]

Chemist Wanted.

Applications are invited by the Borough of Blackpool for a chemist qualified to carry out all tests associated with gas-works practice. [p. 829.]

Mechanism of Coke Formation.

A contribution by Dr. G. E. Foxwell deals with some of the recent ideas enunciated upon the subject of the mechanism of coke formation. [p. 813.]

Gas Engineer and Manager.

Applications are invited for the position of Engineer and Manager to a Corporation Gas Department, the commencing salary being £700 per annum. [p. 830.]

New Showrooms at Rayleigh.

Attractive new showrooms were opened on March 21 by the Gas Light and Coke Company in the Essex township of Rayleigh, within a few miles of Southend. [p. 811.]

New Gas-Works Plant at Clacton.

New gas-works plant was officially inaugurated at Clacton last Saturday. The carbonizing unit consists of upwardly-heated Woodall-Duckham continuous vertical retorts. [p. 806.]

Gas Company Results in 1932.

Further results of the progress of gas companies during the year 1932 are published. [p. 824.]

Glover-West Installations in Hand.

The volume of work which is allocated to the Glover-West system of carbonization indicates that the Gas Industry is more than holding its own in spite of the depression. [p. 803.]

Benzole Recovery.

Concluded this week is Mr. C. M. Wearing's paper before the London and Southern District Junior Gas Association on the Theoretical Aspects of Benzole Recovery, together with a report of the discussion thereon. [p. 814.]

Australian Gas Institute.

The effect of the financial crisis on the business of gas undertakings in Australia is referred to by Mr. S. J. Janes, Secretary of the North Shore Gas Company, Sydney, in his Presidential Address before the Australian Gas Institute. [p. 818.]

THE "GAS SALESMAN."

Will subscribers please note that, in consequence of the Easter Holidays, the April issue of the "GAS SALESMAN" will be published on the 22nd, instead of on the 15th (which happens to be in April the third Saturday of the month).

Forthcoming Engagements

March 31.—SOUTHERN ASSOCIATION OF GAS ENGINEERS.—General Meeting at the Hotel Metropole.

April 1.—SCOTTISH JUNIOR ASSOCIATION (EASTERN DISTRICT).—Visit to Kelty Gas-Works. Address by Mr. J. Storrier.

April 6.—MIDLAND JUNIOR ASSOCIATION.—Meeting. Paper by Mr. W. T. Hobson.

April 7.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Spring Meeting in Glasgow.

April 7.—Annual Meeting of Gas Salesmen in London.

April 10.—I.G.E.—Finance Sub-Committee, 2 p.m.; Finance Committee, 2.30 p.m.; Executive Committee of the Council, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m.

April 11.—N.G.C.—Meeting of Central Executive Board.

April 11.—I.G.E.—Council, 10 a.m.; Gas Education Committee, 4 p.m.

April 11.—FEDERATION OF GAS EMPLOYERS.—Meeting of Central Committee.

April 12.—I.G.E.—General Research Committee, 2.30 p.m.

April 12.—INSTITUTE OF FUEL.—Visit to Beckton Coke Ovens and Greenwich "Metro-Coalite" plants.

April 19.—B.C.G.A.—Meeting of Executive Committee, 12 noon, 28, Grosvenor Gardens, S.W. 1.

April 25.—I.G.E.—Gasholder Sub-Committee, 3 p.m.

April 27.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1, 2.30 p.m. Subject for discussion will be "Benzole Extraction, Technical and Commercial Aspects."

May 5.—NORTH OF ENGLAND ASSOCIATION.—Annual Meeting, County Hotel, Newcastle, at 2 o'clock.

May 11.—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual General Meeting and Dinner, Hotel Metropole, London.

May 11-12.—EASTERN COUNTIES ASSOCIATION.—Spring General Meeting at Croydon.

May 25.—MIDLAND ASSOCIATION. — Spring meeting at Stafford.

1933 "JOURNAL" Directory.

Page 88. LINLITHGOW. William A. M. Stewart appointed Manager vice R. M'Nair, retired.

EDITORIAL NOTES

Rubber Jointing Rings

IN the " JOURNAL " for Nov. 21, 1923, and again in our issue for June 25 of the following year, Mr. Walter Hole described tests which he had made on rubber jointing rings for gas mains, submitted reports from the National Physical Laboratory at Teddington on the condition of rubber rings which had been in service in a large town for more than forty years, and gave his own experiences of the efficacy of rubber for jointing a length of main which, laid in an area where subsidence was prevalent, had previously proved a most difficult proposition. Mr. Hole's contention was that the attitude of mistrust evinced by many engineers towards properly prepared rubber for jointing had no sufficient foundation in actual fact. In support of this, his experience extending for well over twenty years, as well as that of other engineers, was quoted. His conclusion was " that there is no reason, on the grounds of either utility or durability, why rubber should not be used for the jointing of gas mains."

Further evidence of the excellent service which rubber can afford is to be found in our columns to-day. A comparison is made of two rings, one of which had been in use in the Newcastle district for sixty years. The investigation was carried out by the Research Association of British Rubber Manufacturers, and careful tests were made to determine the elastic return of the rubber after extension and compression, its resiliency, and the effects of solvents. The tests show that, even after sixty years' service, a considerable degree of strength and elasticity is retained by the rubber ring. " After sixty years' deformation, with permanent change of shape, followed by release, the rubber is still highly elastic." In the compression tests, the sixty-year-old ring actually showed a greater power of elastic return than the ring which had been in use for two years. As for the effects of solvents, cuttings from the rings were immersed for 400 hours in benzene at 25° C., and the test samples retained their form and showed no signs of disintegration. The report concludes as follows: " In this form of joint the exposure of the rubber to the gas and the duty demanded from the rubber are at a maximum, making the test, of such long duration, a very convincing one."

Thermal Insulation

MANY of our readers will be familiar with a new method of insulation employing aluminium foil. Actually this method uses still air as the insulating medium, and it possesses many advantages. Aluminium foil is light, clean to handle, and easy to apply. For cooker insulation, for instance, this type of packing will not be liable to consolidate itself, and a cooker so treated will heat up as quickly as one which is unlagged. This recent development—it is already a commercial success—has been the subject of a careful investigation by R. B. Mason, who describes the *modus operandi* and sets out the findings in the current issue of " Industrial and Engineering Chemistry " (Vol. 25, No. 3). Quiet air is one of the best available media for preventing heat transfer, and the problem resolves itself into a determination of the best structure for confining the air by the foil so as to eliminate heat transfer by convection and radiation; and the most practical structure for any purpose may be a compromise between maximum thermal efficiency and cost. The investigation referred to has determined some of the fundamental information necessary for the commercial design and utilization of this type of insulation.

The author points out that there are two general methods of using aluminium foil for insulation. One is to provide a framework which supports the aluminium foil and forms a series of air cells between the bright foil surfaces; in the other the foil is first crumpled and then partially stretched so that the resulting wrinkles in the foil separate the sheets when they are laid against each other and provide the necessary separation and air cells. The various factors determining the efficiency are analyzed and the insulation values of a variety of structures determined experimentally. It is proved that it is possible with this type of insulation practically to eliminate heat transfer by radiation and convection, and to approach the insulating value of still air. It was found that aluminium foil insulations with corrugated separators between the sheets of foil are slightly inferior to the plain air-cell type. The baffle effect of the corrugated separator upon the convection streams, causing cold air to be conducted by many paths directly from the cold to the hot surfaces, the conductance of the separator itself, and the covering of a portion of the aluminium surface are suggested as factors which cause a poorer insulation against the flow of heat. As was to be expected, it was also found that insulation structures containing crumpled foil are somewhat inferior to the corrugated structures, the amount of heat transmitted by convection being greater. Here again there are a large number of baffles to deflect the convection streams of air, and convection streams apparently flow directly from the hottest foil to the coldest foil around the edges, unless special precautions are taken to prevent this; also, heat may be conducted from one foil to the next directly through the points of contact.

The main conclusion drawn by Mr. Mason is as follows: " Aluminium foil makes an excellent radiation shield, and with aluminium foil it is easy to eliminate practically all the heat ordinarily transmitted by radiation in an insulation of the air-cell type. The results obtained show that by careful design it is possible to construct an insulation from foil in which there is little or no convection. By using the minimum amount of separator material of high thermal resistance, the foil insulation can be made to approximate the thermal resistance of quiet air. The secret of this outstanding performance of aluminium foil insulation lies in the low thermal emissivity of the bright aluminium surface."

Disfiguring the Landscape

IN the autumn of last year the London correspondent of a New Zealand paper wrote a letter which was in due course published there, and a copy of which was afterwards posted back to this country. It is a glowing account—which must have vastly intrigued readers in the Dominion—of the condition of affairs now " that at last Old England is electrified." The information is vouchsafed that now the pylons are here, there, and everywhere, but nobody appears to be greatly resentful of their appearance. The correspondent, however, finds himself unable to get away " from the fact that a perspective of pylons does spoil a landscape." It does indeed! But if people have so soon become used to pylons, one wonders how it comes about that certain electrical friends find it so difficult to accustom themselves to the sight of a waterless gasholder. Only a few days ago we read about " the presence of all these waterless gasholders that disfigure the landscape; " but after all gasholders are not so plentiful as pylons. This, however, is a digression.

We are for the moment concerned with " the grid in being," with " villagers proud of new lighting," and with " the little towns and hamlets of the Yorkshire Dales," which " are now enjoying the radiance that the pylons help to diffuse." This is the first year, we are told, that the whole of rural England has enjoyed the advantages of electrical illumination. Well, we hope that " the whole of rural England " is duly grateful;

but we have our doubts. So, apparently, has the correspondent; for he thinks that " something national might have been done to celebrate so important an event." But having said this, he immediately dashes from our lips the cup of joy which we had been preparing to drain to its pylons—pardon, dregs. " Perhaps," he says, " the organizers themselves prefer to let the consummation of their efforts pass unnoticed—conscious that the nation has been somewhat behind the 'bus in bringing the ideal illuminant to the dwellers of our more remote regions. Not so the villages of the dales and moors and wolds of the North, the combes and heaths and forests of the West Countree. They are inordinately proud of their new lighting and heating appliances, and, amusingly enough, are firmly convinced they are now leading the world in the possession of one of civilization's greatest conveniences."

There is, however, no need to grieve even though we may be behind some other countries (water power is unevenly distributed over the face of the earth) in the matter of electrification. The correspondent goes so far as to hint at a possible " dispensation of Providence " in our tardiness. " Electric light is a tremendous boon, but it can be abused in the hands of communities that are still too raw to appreciate it. It has come to the English countryside without doing anything to mar the peaceful beauty of our nocturnal scenery." By another " dispensation of Providence," the pylons are hidden from view during portions of the twenty-four hours which vary according to the season.

Coal v. Oil

In the " Western Mail and South Wales News " for Friday last was an article by Mr. W. T. Lane entitled " Problems of Producing Oil from Coal," in which the author in all seriousness put forward the suggestion that coal must be put into a position to compete successfully with oil, gas, and electricity, " if only for the reason that it is necessary to regain as much of our lost export trade as possible." This method of attacking the " back-to-coal " problem is a retrograde step which we believe will find little support. Both electricity and gas are refined forms of energy, and, as such, can perform services which coal either cannot, or, if it can, only with waste. Oil has the advantage over all solid fuels that its combustion can be controlled with a fairly high degree of precision. Greater precision of thermostatic control marks the use of gas and electricity, and gas has the added advantage of better control of atmosphere. We agree that the coal industry must meet oil competition, but Mr. Lane is wrong in his advice for the future. The best way the coal industry can help itself in overcoming competition from oil is *via* gas. It must regard the Gas Industry not as foe, but as one of its best allies; and in this regard facts speak for themselves.

We are surprised at the remarks of Mr. Lane that " it is unwise to lay too much stress upon statements advocating the use of coal gas and electricity and the abolition of oil. The future of the coal industry will be along the lines of increasing manufacture of oil and pulverized fuel. Home-produced oil and pulverized fuel can set up a very effective competition to gas, electricity, and imported oil." And we were glad to see in the " Western Mail " for the following day a letter by Mr. H. D. Madden, of the Cardiff Gas Light and Coke Company. In this he asked what the coal export trade has to do with the gas and electricity undertakings, and he pointed out that the idea that gas and electricity are in competition with coal is not correct. Both are products of coal and good customers of the coal industry. " It must be remembered," wrote Mr. Madden, " that the Gas Industry takes 18,000,000 tons of coal per annum, and the coke oven industry 15,000,000 tons per annum, a total of 33,000,000 tons. The electricity industry uses about 10,000,000 tons per annum. The former industries using 33,000,000 tons per annum take their coal from the bituminous seams, while the electricity industry procures its supplies from the steam coal seams. Instead of being competitors they are excellent customers, and together give continuous daily employment to nearly 200,000 miners in the coalfields. . . . The real enemy at the gate of the coalfields is foreign oil, and the public are unconsciously promoting its use to the detriment of local produce and employment."

Domestic Oil Competition

We learn from the current issue of the " American Gas Journal " that an organization has applied for powers to install a system of piping for carrying oil to domestic customers in a thriving Long Island community. The company seeking these powers claim that four thousand prospects have agreed to avail themselves of this oil service, a rather complete plan, it is stated, having been developed. This plan includes the installation of oil burners for house heating, cooking, and water heating, the equipment to be supplied by the company and serviced on a monthly rental basis. Provisions for equipping each customer with an oil meter, automatic regulating devices, and other necessary apparatus are incorporated. In brief, the difference between this system and that of the Gas Industry lies only in the energy piped.

Commenting on the plan, the " American Gas Journal " says that " perhaps the economies are not feasible, and also the matter of obtaining a franchise might not be as simple as it reads; but, in any case, the proposed arrangement should serve to open our eyes to the fact that the oil fellows are doing some figuring on a pretty comprehensive scale, and, in times such as these, well laid plans for effecting economies in living costs might be put across, regardless of their ultimate worth to the user. Such a scheme for supplying fuel energy might effect economies over a relatively short period, but in the long run would operate in an opposite manner. Gas supply is figured on a long run basis and the customer and city fathers should be guided almost exclusively by this fact."

We do not suppose that any such plan would be contemplated in this country, where oil is an imported product, but we mention it here in the feeling that it will interest our readers and that it is indicative of the activities of our most formidable competitor in the industrial field.

Australian Statistics

The Gas Industry of Australia has had by no means an easy time during the past three years, though it would appear that the greatest depth of the industrial depression in the Commonwealth has been sounded and that there is now movement towards a return to normal conditions. Increased taxation has had the effect of limiting the spending power of the people and restricting the development of industry, and this has led to decreased gas sales since 1929—in fact, the City of Perth is the only undertaking which showed in 1931 an increase in sales over 1930. There is a great deal of leeway to make up to reach the volume of business transacted in 1929, but it is good to learn from the Presidential Address of Mr. S. J. Janes to the Australian Gas Institute—an extract from which is published in to-day's " Journal " —that during recent months the sales of gas show an increase over those for the corresponding period twelve months previously. Many interesting statistics are included in Mr. Janes' address. Bad debts written off by the Metropolitan Gas Companies in the Capital Cities of Australia, for example, grew from £15,331 in 1929 to £32,821 in 1932, and in the same period the staff employed for debt collecting increased in harmony.

Up to 1929 a gradual increase in gas sales was experienced by all gas undertakings, and the position, states Mr. Janes, seemed to justify the view that the increase would be permanent; and plant was extended accordingly. Between 1929 and 1931, however, sales slumped by as much as 8%, and there is a considerable reserve of plant which has increased overhead charges. In the same period sales in Great Britain increased by 3%—from 321,616 million c.ft. in 1929 to 331,610 millions in 1931—so that the depression has not affected the Gas Industry in the British Isles as it has in Australia.

PERSONAL

Mr. W. E. Caton, General Manager and Engineer of the Oxford and District Gas Company, whose appointment as a Director was recently confirmed at the Annual Meeting of the Proprietors of the Company, was on Saturday last, at the Board Meeting, appointed Managing Director and Chief Engineer.

* * *

Mr. William A. M. Stewart, Technical Assistant at the Kirkintilloch Gas-Works, has been appointed Manager of the Linlithgow Gas Company. He succeeds Mr. Robert M'Nair, who retires after 37 years' service.

* * *

Among the candidates nominated for the District Council elections at Blackrod was Mr. J. Kellett, Managing Director, Engineer, and Secretary of the Blackrod Gas Company.

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Mr. Harald Nielsen, M.I.Mech.E., M.I.Chem.E., F.C.S., M.I.Dan.C.E., Consulting, Chemical, and Gas Engineer, announces a change of address from 73, Hayes Road, Bromley, Kent, to 212, Terminal House, Grosvenor Gardens, S.W. 1. (Telephone: Sloane 4891).

OBITUARY

Mrs. Smith, Westgrove, Ayr, who died recently in her 101st year, was the widow of Bailie Smith, of Ayr, who for many years was Gas Manager at Bolton.

* * *

The death has occurred of Mr. John Alfred Harris, aged 79. After leaving school, deceased served a seven years' apprenticeship at the Droitwich Gas-Works, where his father was Manager. After that he was appointed Engineer at Gillingham, Dorset, a post which he occupied for seven years. Then he went to Leicestershire, and was for 45 years Engineer, Manager, and Secretary of the Great Wigston Gas Company. Mr. Harris was a member of a large family of Gas Engineers, whose good services for the Gas Industry have been appreciated at Taunton, Great Wigston, Brigg, Lyme Regis, Accrington, Ashbourne, Market Harborough, and Lutterworth.

THE NEWS OF THE WEEK

The Travelling Showroom of the Newcastle-upon-Tyne and Gateshead Gas Company continues to be successful in bringing before customers in outlying districts the modern achievements of gas. During its tour last year, 18,000 persons inspected the showroom.

The Following Wording for a plate to be affixed to the old street gas lamp standard in the Castle Grounds has been agreed by the Guildford Corporation: "Guildford's First Street Gas Standard erected in 1824 in Upper High Street. Presented to the Town by the Poyle Charity Trustees, July, 1932."

Ten Thousand Gallons of the new "gas spirit" produced by the Glasgow Corporation Gas Department has been delivered to the Transport Department for experimental purposes as a substitute for petrol for their 'buses. Untaxed, as it is, it is much cheaper fuel than petrol, and the Gas Department can produce 100,000 gallons per annum.

The Faversham Gas Company held an extremely successful series of Cookery Demonstrations in the Gas Showrooms during the week March 13-18 inclusive. Attendances were very good, totalling over 700 for the series, and great interest was shown in the demonstrations and also in the gas appliances exhibited. The demonstrations were given by Miss Zita Noble, Cordon Bleu, of Radiation Ltd.

Cookery Demonstrations.—Under the auspices of the Scarborough Gas Company, in conjunction with the Parkinson Stove Company, Birmingham, a series of cookery demonstrations was held last week in the Centenary Hall, drawing large audiences. The demonstrator was Miss H. Crawford-Fox, and the interest aroused by her demonstrations manifested itself by the many practical questions which were asked and answered each session. The Gas Company had a comprehensive exhibit of modern gas appliances, and good business was done during the week.

Despite Prevailing Conditions, the stockholders of the Consolidated Gas Company of New York increased in numbers last year. At the end of 1932 there were 22,231 holders of $5 cumulative preferred stock and 90,986 holders of common stock, an increase during the year of 8620 stockholders. The gas sales of the Consolidated Gas Company and its Affiliated Gas Companies decreased 2·40% as compared with 1931; total sales amounting to 41,170,403,800 c.ft. in 1932, a decrease of 1,013,828,900 c.ft. At the end of 1932 the Companies had 1,322,482 gas meters on the premises of their customers.

Gas-Driven 'Bus Experiments in Newcastle.

The Northern General Omnibus Company are still in the experimental stage with the gas-driven 'bus which was introduced two months ago.

The 'bus, which has containers made at the Elswick works of Vickers-Armstrong, fitted to the chassis for holding high-pressure gas, has travelled a considerable mileage.

The experiments are being carried out at the 'bus Company's works at Bensham, and we understand from the "North Mail" that they are proceeding satisfactorily, although it was expected that the 'bus would have been brought into regular passenger service a week or two ago.

"Progress is being made," an official of the Company said, "and the experiments now concern a matter of little details. We cannot say when the 'bus will be brought into use. It may be any time."

Leeds Training and the Gas Industry.

The Annual Dinner of the Fuel Department of Leeds University is a happy informal affair enjoyed alike by staff, old students, and undergrads; and the 1933 gathering, when the guest of the evening was Mr. D. M. Henshaw, Managing Director of the Huddersfield firm of W. C. Holmes & Co., Ltd., proved no exception to the rule.

Calling upon Mr. Henshaw to propose the toast of "The Fuel Department," Prof. J. W. Cobb, who was in the chair, referred to the great practical interest which the firm of Holmes had taken, and continued to show, in the work and welfare of the Department; and he mentioned especially the endowment of the William Cartwright Holmes Scholarship—one of the most valuable scholarships tenable in the Department.

In proposing the toast, Mr. Henshaw said that for many years they in Huddersfield had turned to Prof. Cobb for help, and in the technical section of the staff of his firm there were now nine University men, five of whom, including Mr. F. B. Holmes, were old students of the Fuel Department. "This is an age of specialization," continued Mr. Henshaw, "and the technologist must come into his own. The Gas Industry's reply to the electrical grid is being evolved in the concentration of manufacture and distribution in large units, and those in control of them will become more and more dependent on people trained in such centres as Leeds University. As to the future, the Industry has an enormous advantage over the electricity industry in being able to purvey energy in three forms—solid, liquid, and

gaseous. And in all three fields there is an enormous amount of work to be done.

" By more careful selection and cleaning of coals, blending, and better control of carbonization, a fuel can be produced which could be sold, if properly marketed, at a price which would amply repay the cost of its preparation. Liquid fuels are even more in process of development; there is a potential consumption of benzole and tar oils many times in excess of the supply at present available from gas-works. As for gas, if anyone could discover a cheap and simple means of producing oxygen in bulk, the dream of complete gasification producing gas suitable for town supply would be realized.

" Turning to purification, here again there is a wide field for research and invention. Continuous methods for ridding gas of sulphur compounds will have to be developed which do not involve either constant or intermittent labour costs, while another field for activity is the recovery, in a marketable form, of sulphur, possibly in combination with ammonia."

Mr. H. J. Hodsman responded to the toast on behalf of the staff of the Department, Mr. H. Hollings, of the Gas Light and Coke Company—the first Research Student at the time Prof. Cobb and Mr. Hodsman joined the Department twenty-one years ago—for the old students, and Mr. A. C. Bureau for the present students.

Gas Exhibition at Oldham.

Speaking at the opening of an Exhibition of gas appliances at Oldham, Alderman Wilkinson, Chairman of the Gas Committee, said there were 60,000 gas consumers in Oldham and district, and for them over 100,000 appliances of one sort and another had been installed.

Mr. Ernest Parry, Commercial Manager of the Gas Department, mentioned that there were 40,000 gas cookers and 20,000 boilers in use at the present time, and there had been a greater increase in the use of these appliances during the past ten years in Oldham than in any other town in the country.

The Gas Committee were seriously considering a scheme somewhat like the " all in " system for electricity. If consumers would agree to a fixed charge on the rateable value it would be possible to supply gas cheaply, and this would encourage the use of gas appliances and increase the benefits for the mass of the consumers. The Committee were prepared to install coke fires for a six months' trial without charge, and if the consumer was not satisfied at the end of the trial the coke fire would be removed. Coke fuel had been tested over a period of four years and had been proved to be as good as coal at one half the cost, and with half the labour.

Explosion at Gateshead.

On Monday last a serious explosion took place in Carville Street, Gateshead, as a result of which six people were killed and fifteen injured. On one side of the street were houses, and comparatively recently a 6-in. main had been laid in the footpath, with a service leading to a school on the other side of the street.

A contractor re-making the road in the street was employing a steam navvy, the grab of which caught the service in the middle of the road. The service was wrenched from the main, together with a piece of the main, and as a result a large volume of gas accumulated under the floors of two houses. The gas-air mixture ignited at a kitchen fire of one of the houses, which was divided into two flats. This house was razed to the ground, and the other was badly damaged.

New Scale of Charges at Oxford.

A reduction in the price of gas for all types of heating, light, and power purposes in the City of Oxford is announced by the Oxford and District Gas Company.

After the March quarter's reading of meters, consumers in Oxford will be able to get their gas at one of three rates. First, there is the general rate, available to all consumers, of 8·d. per therm. Secondly, any consumer can, if he wishes, pay 5s. a month, or any part of a month, payable quarterly for each service or meter connection, *plus* 6½d. a therm for all gas actually consumed on a single premises.

The third choice, also open to all consumers, is to pay 33s. 4d. a month, or any part of a month, payable quarterly for each service or meter connection, *plus* 6d. a therm for the first 7000 therms consumed each quarter on one premises, and 5d. a therm for all gas consumed in excess of 7000 therms a quarter.

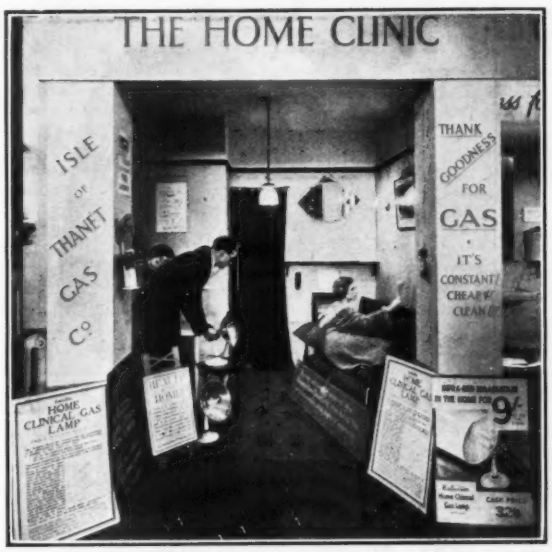
It is pointed out that consumers of between 112·5 therms and 1275 therms a quarter per meter will benefit under the second scale, and those using over 1275 therms a quarter will further benefit under the third scale. The rents of meters and other apparatus on hire are not affected by the new scales, and the prevailing statutory increases must be added to the new prices outside the City of Oxford. The service charges, however, remain constant in all areas.

It is further pointed out that if a reasonable amount of gas is being used, the second and third scales, known as the two-part tariffs, offer a chance of wise economy and added comfort. It will now be possible to take full advantage of the gas supply offered with the knowledge that the further service obtained costs 20% less than the flat rate charge.

A Margate Exhibition.

At the Twelfth Annual Exhibition recently held at the Margate Pavilion and Winter Gardens the Isle of Thanet Gas Light and Coke Company arranged a " live " demonstration of the new Home Clinical Gas Lamp, which created considerable interest.

There was also a particularly fine display of hot-water apparatus, and the recesses in which these were housed at the back of the stand had dark blue background and, with the white appliances, the effect was most attractive. In the same bay were two refrigerating units, together with a snow-producing unit.



Actual People replace Cut-Outs in this Display and transform a Static Exhibit into a Demonstration of Lively Interest and Appeal.

Cookery demonstrations were given alternately with the Clinical Lamp display, while a poster artist alternated with the two in depicting the various uses of gas by means of smart, up-to-date, topical sketches and applications. It was a highly effective display.

The Exhibition was opened by Sir William Arbuthnot Lane, and he was especially interested in the Clinical Lamp, and expressed his appreciation of its virtues being brought to his notice.

Gas Light and Coke Company Bill.

At the last meeting of the Westminster City Council the Law and Parliamentary Committee submitted a report stating that a Petition on behalf of the City Council and the Councils of Holborn, Chelsea, and Southwark had been deposited against the Gas Light and Coke Company Bill which sought to prevent a Local Authority from imposing in connection with premises let, sold, or leased by it any conditions as to the form of heat, light, power, &c., to be used.

The Committee had considered a proposal that the City Council and its joint Petitioners should join with the London County Council in opposing the Company's Bill, one-half of the cost of the opposition to be borne by the London County Council and the other half by the four Metropolitan City and Borough Councils. The Law and Parliamentary Committee was informed that the Councils of Holborn, Chelsea, and Southwark were not likely to object to the adoption of the Council's suggestion as it would effect

THE NEWS—*continued.*

some consolidation of the opposition to the Bill and a reduction in the cost.

A recommendation to give effect to the Committee's views on the matter was carried without debate.

A Dickens' Dramatic Recital.

There was a "crowded house" recently at the White Rock Pavilion, Hastings, attracted by the announcement of a Dramatic Recital from Dickens' "Pickwick Papers" to be given by Mr. Walter T. Dunn, F.C.I.S. (who was Secretary of the Institution of Gas Engineers), in aid of the local Y.M.C.A.

The Mayor of Hastings, Councillor H. Burden, accompanied by his daughter the Mayoress—Miss Burden—took the chair; and after he had introduced Mr. Dunn, the Mayoress unveiled a bust of the immortal writer, which had been executed in 1912 by the students of the Municipal School of Art for the centenary celebrations of the birth of Charles Dickens.

Mr. Dunn as Serjeant Buzfuz.

Mr. Dunn then recited an original panegyric; and proceeded to give the first part of his recital consisting of Chap. XII.—"Descriptive of a very important proceeding on the part of Mr. Pickwick, no less an epoch in his life, than in this history." In it Mrs. Bardell is discovered in a simulated fainting state in the unwilling arms of Pickwick.

After an appeal for the Y.M.C.A. by the Mayor, which was remarkably well responded to, Mr. Dunn's second part of the recital was given—viz., Chap. XXXIV., "Wholly devoted to a faithful report of the memorable trial of Bardell against Pickwick." During this, Mr. Dunn appeared as depicted in the accompanying photograph.

As a corollary to the Recital the Hastings Branch of the Dickens Fellowship is to be resuscitated, after being in a state of suspended animation for fourteen years.

Gas as a Motor Fuel.

In a Special British Motor Supplement to "The Times" of yesterday a correspondent discussed the use of fuels alternative to petrol. The following is an extract from the article:

"The search for a domestic supply of motor fuel has continued unabated, but the alternative to petrol that will compare with it in general efficiency, in accessibility, and in price has yet to be found. Coal gas is an admirable fuel, and as the chief drawback to its employment—that of compressing the gas into a small and light enough container to be carried conveniently on a vehicle—has been overcome except for the light car, we may find in the near future a wider application of gas in heavy commercial vehicles and in passenger cars operated by cities owning their own gas-works.

"As a fuel for pleasure cars, coal gas is impracticable chiefly because of the container problem and the fact that supplies of the gas in the required state of refinement are limited and obtainable only from certain tar distillers and gas undertakings. No doubt, supplies of gas fuel would be augmented if demand for it expanded, but its distribution in the petrol sense is extremely improbable, for it is questionable whether there could ever be sufficient quantities of the gas to permit the necessary ramification of filling stations to make its use in private cars possible. The matter of quality also arises, and probably gas fuel suppliers would not be in a position to guarantee a uniform quality; and the motorist is entitled to demand that the fuel he uses does not vary and is readily obtainable in all parts of the country.

"In regard to the production of motor fuel from coal, Great Britain already possesses the means for producing some 70,000,000 gallons of benzole per annum by high-temperature carbonization. If low-temperature carbonization were fully developed we might produce altogether by carbonization an amount equivalent to a fifth of our present imports of petrol. The possibility of converting the heavy tar oils obtained in coal carbonization into petrol is being investigated, but the prospect of such oils being available in sufficient quantities to yield appreciable amounts of motor spirit is remote, while the cost of conversion is prohibitive."

North British Association of Gas Managers.

The Spring Meeting of the Association will be held on Friday, April 7, in the Ca'doro Restaurant, 122-132, Union Street, Glasgow. The chair will be taken by Mr. A. S. Nisbet, of Paisley, at 11.15 a.m., and he will deliver his Presidential Address.

Following the meeting, luncheon will be served in the Banqueting Hall of the Restaurant. After the luncheon, by the invitation of the Glasgow Corporation and Mr. J. W. McLusky, the Engineer and General Manager, members have the opportunity of visiting Dawsholm Gas-Works.

A Golf Competition, under handicap rules, will take place over the course of the Glasgow Golf Club, Gailes, on Thursday, April 6, when the Silver Cup, presented by Mr. J. Winson Scott, of Manchester, will be played for.

Yorkshire and Lancashire Juniors Visit York.

The customary annual joint meeting of the Yorkshire Junior Gas Association and the Manchester and District Junior Gas Association took place on March 22nd, when a large gathering of members of both societies assembled at York, for a tour of the Monkbridge Works of the York Gas Company.

In the absence, owing to illness, of Mr. H. E. Bloor, Engineer, Manager, and Secretary of the Company, the visitors were met and welcomed by Mr. J. Richmond, Assistant Engineer. Divided into small groups, they were conducted over the works by Mr. Richmond and Messrs. Nichols, Ferguson, and Bennett. The item of most interest was the Klönne dry gasholder, which has a capacity of 2 million c.ft. of gas and was completed in 1931. The holder is 186 ft. high, and most of the visitors went to the top and were taken down the inside of the holder, where Mr. Richmond explained the method of sealing, &c.

Another point of interest was the Trefois producer-gas plant, in which inferior fuel (fine coke and dust) is utilized, yielding a producer-gas of a calorific value of 120 B.Th.U. per c.ft. This gas is used for heating the horizontal retort settings. The plant has a revolving grate and the clinker is automatically collected at the bottom.

Several members of the visiting parties were interested in the 10 ft. purifiers, which are 30 ft. square and 10 ft. deep. Cast-iron bottom plates are absent, their place being taken by a concrete raft. The purifier house is some distance from the wet purification plant and the mains are partially overhead. As cooling of the gas occurs during cold weather, the gas is passed round a nest of tubes, which are steam-heated, enabling the gas to enter the inlet box at a temperature of from 65° to 70° F. Owing to the number of valves employed, use is made of an indicator board fitted with sliding panels, numbered 1, 2, 3, and 4, each panel having a metal arrow to show the direction of the flow. The plant is covered by a steel-framed structure designed to carry the telpher system by which the boxes are emptied and filled.

After the works tour, the visitors were conveyed by motor coaches to the Davy Hall in the city, where tea was served. Mr. J. W. Wood (Leeds), President of the Yorkshire Association, expressed on behalf of the Yorkshire

Association a welcome to the Manchester District visitors. Mr. Wood also, on behalf of the whole party, voiced thanks to the Directors of the York Gas Company and to Mr. Bloor for the excellent facilities afforded for the visit and hospitality, and to Mr. Richmond and members of the staff for their courtesy and helpfulness during the visit.

Mr. H. P. Lupton (Liverpool), President of the Manchester District Association, seconded the vote of thanks, to which Mr. Richmond, on behalf of the Company, Mr. Bloor, and fellow members of the staff, responded.

The party subsequently were shown interesting films of processes in operation at the works and of the York Gas Company's up-to-date travelling showroom.

Engineers and the Sea-Going Fraternity.

That the origin of the Institution of Engineers-in-Charge was very closely associated with the sea-going fraternity, was claimed by the President (Lieut.-Col. J. D. K. Restler, O.B.E.) when speaking last Friday at the thirty-third annual dinner of the Institution, which took place in the King's Hall, at the Holborn Restaurant. The founders discovered, he said, that a large number of people imagined that practically anyone could handle machinery, when it was once installed. This was not true. The type of knowledge required by the Engineer-in-Charge was very similar to that needed by the sea-faring man, because in each case it was essential that the machinery should be kept running. Both must be able to think quickly and be resourceful, so as to meet any emergency. Mr. Alan E. L. Chorlton, C.B.E., M.P. (President of the Institution of Mechanical Engineers, and a Vice-President of the Institution of Engineers-in-Charge), asked whether it was not time for some of the Societies like their own to have some sort of mass convention, which would enable them to express themselves in such a way as to secure due recognition throughout the country. Unless they did something of this character, they would not obtain the recognition to which they were entitled. It was essential for them to get together in great numbers. Sir Edward Holland, D.L., proposing "Our Public Services," referred to gas, electricity, and water, and the extent to which continuous service and abundant supplies of all were taken for granted. How many people, he asked, gave a thought to the labours of the people who were responsible for giving them these inestimable advantages? It was, however, small wonder that people took these services for granted, because they were given with such regularity. Other speakers were Alderman R. W. James (Vice-Chairman of the Metropolitan Water Board), Mr. E. A. Sandford-Fawcett, C.B. (a Vice-President of the Institution), and Sir Alfred Baker, L.C.C.

It was remarked by the President that no statement regarding the Institution would be complete without some reference to their good friend Captain A. E. Penn, whose whole life really was wrapped up in its welfare. As Hon. Secretary, he did a vast amount of good work on their behalf.

The health of the President was enthusiastically drunk by the 200 and more members and friends present; the proposer being Mr. A. T. Penn, Vice-Chairman of the Institution.

Midland Juniors Visit Chesterfield.

Members of the Midland Junior Gas Association visited the works of the Staveley Coal and Iron Company, Ltd., Chesterfield, on March 16, by the courtesy of the Directors of the firm.

The visitors were received by Mr. H. Beresford, the Chief Commercial Manager, and Mr. F. Allen, the Manager of the Sand-Spun Plant.

The firm has been in existence for over 200 years. The works are extensive, covering an area of 200 acres and employing round about 4000 men.

Upon arrival the visitors inspected the sand-spun pipe plant, and after lunch the party was divided, one section visiting the vertical cast pipe plant, while the remainder inspected the bye-products and blast furnaces at Devonshire Works. Here they saw a blast furnace plant with an annual output of 265,000 tons from the four blast furnaces.

The ore for these furnaces is drawn from Lincolnshire, Northamptonshire, and Leicestershire, while the firm has its own collieries in Derbyshire and South Yorkshire, from which 4 million tons of coal per annum is produced, a proportion of which is utilized by the coke ovens.

At the conclusion of luncheon, Mr. H. Beresford gave a short address of welcome to the visitors, to which Mr. F. A. C. Pykett, the President of the Association, responded —Mr. J. H. Morris, Ironwork Inspector of the Birmingham Gas Department, saying a few words in support.

Included in the vote of thanks to the Directors was the name of Mr. G. H. Calvert, the firm's Birmingham and West of England Commercial Manager, who had charge of the organization of the visit.

Glover-West Vertical Retorts in Hand.

The Gas Industry is more than holding its own in spite of the depression and the mild weather which reduced the usual annual increases last year to nearly level gauge in many cases, and an absolute vacuum in some instances. Extensions and renewals are the order of the day; new installations are the exception. The volume of work which is allocated to the Glover-West system must be regarded as satisfactory.

At the Rochdale Road Works of the Manchester Gas Undertaking it has been decided to replace one-half of the installation built in 1914 by a new bench containing 24 of the 50-in. retorts of the new model, with a daily capacity of 2½ million c.ft. The existing coal plant is to be extended and modified, and coke conveying plant is to be added. The installation at Altrincham is to be extended by the addition of eight further 40-in. retorts, and a new lip-bucket conveyor is to be placed around the whole installation. Coke will be delivered to a new West coke grader over the existing hoppers.

Newhaven is a small installation comprising four 33-in. retorts with coal and coke handled by the lift, with a skip hoist as a stand-by—a very neat and economical installation for a 40 million works. Portheawl with three 50-in. retorts is a very similar installation for a works of 45 millions annual demand. In both instances the retorts are in single units. The retort house building at Portheawl, being situated within sight of the promenade of a seaside resort, has been specially designed in accordance with its surroundings. Extensions to the ancillary plant, such as condensers, washers, scrubbers, &c., are included

At Leigh, the second installation of twelve 40-in. retorts is being further increased by the addition of four similar retorts. At Yeovil, the extension is one of four 33-in. retorts, while the Johnstone installation, which was only brought into operation in the autumn of 1930, is being extended by the addition of two more 50-in. retorts.

Reconstructions from the old to the new model retorts, with the steaming chamber at the base, are still being undertaken. The second retort bench at Newcastle-upon-Tyne to be treated in this way is practically finished, and guarantee tests are in progress. It consists of forty retorts, which complete the reconstruction of the whole of the first installation of Glover-West retorts erected in 1913. Originally, this retort house had a daily capacity of 2½ million c.ft. It will now be capable of making nearly 8½ million c.ft. per diem. The completed house contains two large Spencer-Bonecourt waste-heat boilers. At Helensburgh, the oldest Glover-West vertical retort installation in Scotland, eight retorts are being reconstructed, and at Bridgwater four more of the twelve retorts are being remodelled on the same lines. The vertical retort house at the Radford Works of the Nottingham Corporation, the design of which dates back to 1913, is being completely rebuilt with retorts of the same dimensions as the original ones, but with the modern type of heating.

Abroad, the installation at Plzen (better known as Pilsen), in Czechoslovakia, is being extended by the addition of four 40-in. retorts, while the Cie. Gle. de Construction de Fours of Paris is building, under licence, installations at Creil, Niort, and Libourne, in France, and Forli, in Italy.

The first two large installations of chambers, on what has been called the New West Vertical System, to be contracted for are those for Tilburg (Holland) and Copenhagen (Denmark), the former for a daily capacity of 1,600,000 c.ft. per diem, and the latter about 5½ millions. In both these cases a coke denser and harder than that obtained in continuous carbonization was called for. Some details of the new system have already been published in the Patent records, and it will be remembered that the charge is stationary during actual carbonization. The system, however, is still a completely enclosed one, heat is recovered from the residual coke, and the latter is discharged dry and cool. After a considerable amount of experiment in the research plant of the makers in Manchester, an installation was built at the Shoreditch Station of the Gas Light and Coke Company, where, after some modifications, it is working satisfactorily. And two chambers on the same principle were included in the extension of the vertical retort installation at Dudley which has just been completed. The new system is a distinct departure from existing methods of carbonization, and promises to be of very great interest to the Gas Industry.

FLOODLIGHTING OF BUILDING ESTATES

An Excellent Means of Publicity

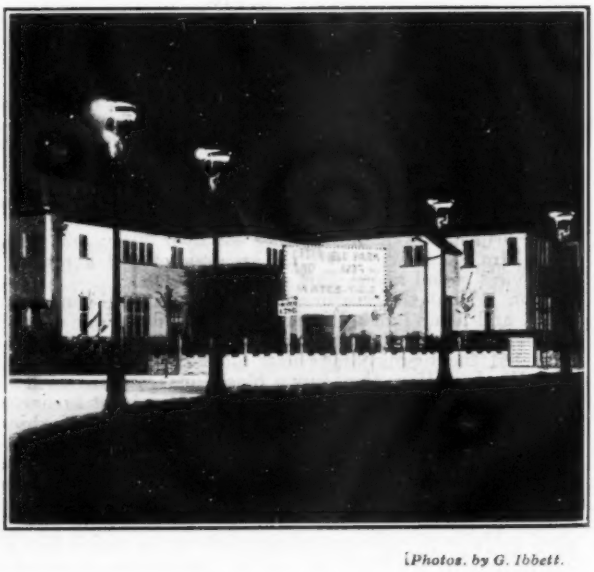
By R. S. Ross.

[*Photo. by G. Ibbett.*

No opportunity should be lost by the Gas Industry to prove that gas lighting can hold its own—and, in many cases, more than its own.

The Wandsworth and District Gas Company is fighting strenuously and successfully to retain its lighting load and to keep gas lighting well to the fore. With this aim in view it has recently carried out several schemes of flood lighting in competition with electricity, and from the photographs published it will be seen that the results obtained are eminently satisfactory.

The floodlighting in two of our photographs was designed and carried out by the Company's Lighting Inspector on a new building estate in the Company's area. The lighting units are four Sugg nine-light Rochester lamps mounted on 12-ft. columns. The special reflector on each lamp was designed for this particular scheme, and it has proved so satisfactory that the Company has adopted it for use wherever possible. The distance from the lamp to the houses is 60 ft., and the spacing distance of the columns is 15 ft. The estimated illumination on the houses is 1½ foot-candles. The height from the ground level to the top of the chimneys is roughly 30 ft.



[*Photos. by G. Ibbett.*

Property of
Seattle Public Library

When it is realized that the whole of this lighting is bearing a gas consumption of less than 4d. per hour, it is hard to see what other form of lighting could compete with it.

Builders' hoardings on new estates are invaluable media of publicity, and for this reason the Company has always endeavoured to persuade the builder to have his board lighted. The benefit is mutual, and the average live builder is only too ready to see this point of view.

The Company has floodlighted a number of these hoardings in various parts of its area, and one of our photographs shows a typical result. The particular board is lighted by two of the units described above.

This method of lighting is adopted wherever possible, but where circumstances will not permit the use of columns, the alternative method of lighting from above the board is adopted. In this latter case, the size of hoarding determines the size and number of lamps. Several small units are preferred to one or two larger ones, as the former give much more even distribution, and do not increase the consumption in any way, excepting, of course, a negligible amount of by-pass consumption.

In view of the fact that these hoardings and estates are in public view the whole time, and that a notice is attached to the boards stating that " This Floodlighting is by Gas," their value as propaganda cannot be overestimated. This was borne out a few days ago when the electricity failed in a certain area for nearly two hours, and while the whole neighbourhood was in darkness, these gas lighted houses and boards stood out in vivid contrast, proving once again that " Gas Never Fails."

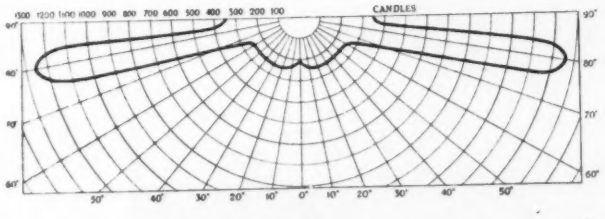
Gas lighting is not dead, nor is it dying, despite the pessimistic preachings of many within our own ranks.

NOTES ON PLANT AND PROCESSES

New Two-Way Asymmetrical Street Lamp.

For Low-Pressure Gas.

Our readers will be interested in a new double-way reflector lamp, the maximum illumination from which is emitted 70° to 80° from the vertical. We are informed by the makers—Messrs. C. H. Kempton & Co., Ltd., Stangate House, 235, Westminster Bridge Road, S.E. 1—that there is only a loss of approximately 27% of the maximum intensity in the horizontal plane 40° from either side of the axis of the lamp, thus adequately illuminating side walks and surrounding buildings. (300 candle power per bijou nozzle is stated to be a safe base for calculating the maximum intensity in the area of the beam—see light distribution curve.)



Vertical Light Distribution Curve of the New Two-Way Asymmetrical Street Lighting Unit. Four Bijou Mantles on either side.

The lamp throughout has been designed for simplicity in maintenance, maximum efficiency, and, as far as possible, to eliminate the diversity factor in street lighting. At the same time the question of appearance has not been overlooked.

The height of light source from which this lamp should be operated is 14 ft., and spacing from 150 to 200 ft. The lamp is constructed of heavy gauge copper, and the parabolic trough reflectors are firmly held to the base of lamp by a double-sided parabolic brass one-piece casting which ensures no possible movement of the vertex of the reflectors, which are of stainless steel.

The focal adjustments for the superheaters and mantles are quite simple; as a matter of fact, there is no need for them ever to be touched. The horizontal adjustment is by means of a sleeve bunsen and the vertical adjustment is by an extended threaded bar from the elbow at the back of the superheater; the superheater can be removed in a matter of seconds and replaced without necessarily losing the focus.

The main gasway comes up the side of the lamp to the patent plug gas ejector with detachable nipple, the whole of which can be withdrawn by a thumb screw outside the casing, leaving a clear passage through to the bunsen tube and superheater for cleaning and inspection purposes. The cast clock control box has been designed to follow the general line of the lamp. It has a double door to facilitate adjustments and maintenance of the clock. The dimensions are: Height over all, 13 in.; length, 22 in.; width, 17½ in.; spigot cap, 3½ in.

The maximum intensity from a lamp with four bijou mantles is 1275 c.p., and with six bijou mantles 2000 c.p. The approximate service illumination is stated to be as follows:

Mounting Height.	Spacing.	Road Width.	Foot-Candles.
14 ft.	140	40	0·08/0·09
	160	40	0·06/0·065

The average illumination on the footway from one lamp is given thus:

	Foot-Candles.		Foot-Candles.
10 ft.	0·73	50 ft.	0·078
20 ,,	0·25	60 ,,	0·063
30 ,,	0·078	70 ,,	0·045
40 ,,	0·065	80 ,,	0·032

Gas Meters by Cowan.

This is the title of an interesting brochure recently published by Messrs. W. & B. Cowan—incorporated in Parkinson & Cowan (Gas Meters), Ltd.—of Terminal House, 52, Grosvenor Gardens, S.W. 1.

The dry gas meter, introduced in 1844, changed very little until recent years. Owing to the great increase of cooking and heating appliances in the domestic household, however, there arose a demand for meters with greater capacity and occupying less space. Without any radical alteration in design, this demand has been met chiefly by enlarging the interior gasways of the meter. A reasonable increase in the slow speed of the mechanism has presented no difficulty, and it is possible that the limit of advance in this direction has not yet been reached; but this must be accompanied by some modification of the stroke and setting of the diaphragms.

Cowan dry meters are made in various types, including standard, high-capacity, and the new small high-capacity, with special types for specific purposes such as for hotels, boarding houses, flats, &c. Any Cowan dry meter can be fitted with prepayment attachment, and three distinct prepayment models are described and illustrated in the catalogue. As a result of progressive design, careful manufacture, and accuracy in registration, Cowan meters give long and satisfactory service; reducing expenditure on meter upkeep to a minimum.

After describing and illustrating many of the firm's different types of meters, including the " Super-Two " prepayment model, which has a single slot for pennies only, shillings only, or both pennies and shillings at the option of the undertaking, the brochure goes on to deal with the " Ferro-Meter "—a cast-iron apparatus large in capacity and small in bulk, for positions where a tin case is unsuited; the " Duplex " meter, whose drum has been introduced as an improvement on the original design in speed and smoothness of action; test meters and gasholders, conforming to Board of Trade regulations; a wide range of pressure gauges, retort house governors, and a new type of service cleanser which dispenses with the bell shape, substituting a copper dome-shaped body.

NEW PLANT AT CLACTON-ON-SEA

Saturday last witnessed the inauguration of an important extension to the existing gas-works, which comprises a new installation of upwardly-heated continuous vertical retorts and ancillary plant

The development of Clacton-on-Sea began as recently as 1870. In 1875 the Clacton-on-Sea Gas and Water Company was formed and the first gas-works was built on the present site. The Undertaking was purchased by the Clacton Urban District Council from the Company and taken over on June 24, 1899. The price paid for the Gas Undertaking was £47,000 and a further £10,000 was at once spent in enlarging and improving the gas-works. This sum of £57,000 was borrowed in 1900 for a period of 40 years at 3% and 3⅛% interest, and the principal and interest thereon still form an annual charge upon the revenue of the undertaking. The make of gas in 1899 was 17 million c.ft., there were 558 consumers, and 90 cookers were in use in the district. By 1931 the make of gas had increased to 147 million c.ft. and the number of consumers to 4599, while the number of cookers and other large apparatus in use in the district was 7363.

To keep pace with the rapid development of the town and the growing demands of the district, the gas-works plant was extended from time to time. In 1929 an agreement was concluded by the Council with the Tendring Hundred Waterworks Company for the supply of gas in bulk from Clacton to the Company's Walton-on-Naze Gas Undertaking, the Company agreeing to close down their gas-works and to take the whole of the gas required in their district for 21 years, the bulk supply to be delivered daily into the Company's gasholders at Kirby, at a distance of six-and-a-half miles from Clacton.

On Dec. 10, 1930, the Council obtained a Special Order, scheduling the bulk supply agreement, extending the limits of gas supply to include the adjoining Parishes of Holland-on-Sea and St. Osyth (also rapidly growing health and pleasure resorts), and scheduling additional land, adjoining the existing gas-works at Clacton-on-Sea, for the extension of the gas manufacturing and storage plant.

The New Plant.

In November, 1931, the sanction of the Ministry of Health was obtained for a loan of £47,600, for the extension of the Clacton Gas-Works and the provision of the necessary boosting plant and high-pressure main to afford the bulk supply to the Walton-on-Naze Gas Undertaking.

The carbonizing installation consists of one bench containing ten latest type upwardly-heated Woodall-Duckham continuous vertical retorts, capable of carbonizing 57 tons of coal a day and of producing 1,020,000 c.ft. of gas per 24 hours. The retort bench is heated by a battery of two producers placed at the retort house floor level at one side of the bench. The installation is erected in a new steel-framed brick-panelled retort house. The installation and retort house are so arranged that additional retorts can be installed, when required, without interfering with the working of the neighbouring retorts in the bench.

The ten retorts are arranged so that any one retort can be heated up, cooled down, or scurfed without affecting the others, and in addition transverse air-cooled division walls are built between each pair of retorts to enable reconstruction to be carried out without interference with the working of the neighbouring retorts in the bench. Each retort is about 25 ft. high and of rectangular tapered shape,

General View of Clacton Gas-Works.

having a major axis of 62 in. and a minor axis of 10 in. at the top.

The retort design is in accordance with the latest Woodall-Duckham practice into which a number of special features have recently been introduced. While retaining the vertical flue construction, which lends rigidity to the retort structure and also facilitates inspection from one level, the combustion of the heating gases takes place in an upward instead of in a downward direction. This produces a zoning of heats which has been found to give the following advantages:

(*a*) Perfectly regular travel of the coal.
(*b*) Less scurf formation, and less loss of time at scurfing period.
(*c*) Better steaming conditions.

The Woodall-Duckham system of upward heating in vertical flues, which follows the natural flow of the hot combustion gases, is particularly simple to put into operation and control. When the heats have once been regulated, only the steam pressure injecting the primary air to the producers and the waste gas dampers need adjustment.

By the introduction of the upwardly-heating principle the temperature in the vertical combustion flues is sufficiently reduced at the point where erosion of the silica material normally takes place to allow the retorts at this level to be constructed with perfect safety in firebrick. By the time the coal has travelled past this belt of firebrick and enters the silica portion of the retort, it has acquired a sufficient heat to avoid the extreme differences in temperature on either side of the retort wall, which is the main cause of erosion of silica material at this point. In this way the full advantage of silica construction as regards high throughput of coal is obtained, with a reduction in maintenance costs.

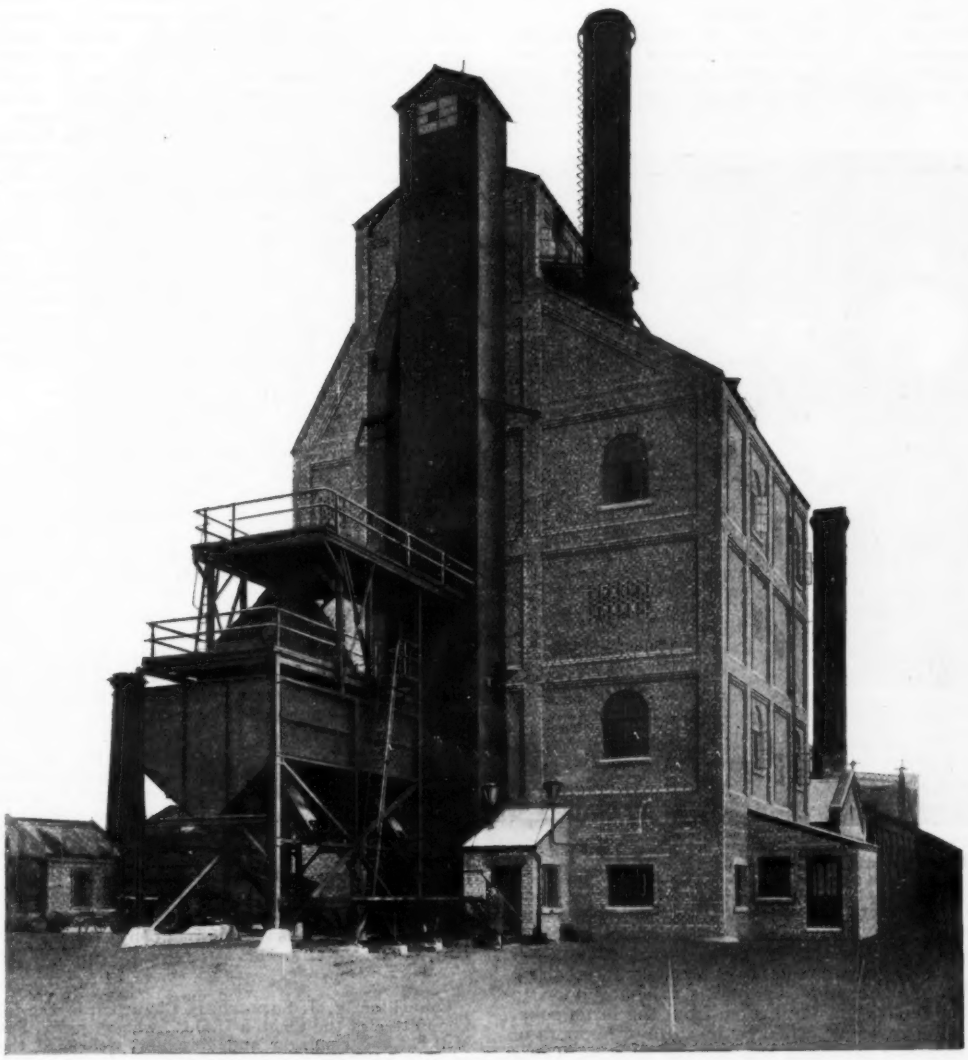
Both the side walls and the top of the bench are efficiently insulated, with the double object of improving the working conditions and saving fuel.

Coal is delivered by lorries into a 5-ton receiving hopper arranged at the yard level. From this hopper the large coal is fed into a 15-ton per hour two-roll coal breaker by means of a jigging feeder fitted with a screen which allows the small coal to pass through a by-pass chute. The broken coal and the small coal by-passing the breaker is delivered through a chute into a 15-ton per hour cased-in bucket elevator which delivers it on to a 15-ton per hour push-plate conveyor arranged above and along an overhead coal storage hopper of 48 hours' capacity situated above the retort bench. This conveyor delivers the coal into the various bays of the hoppers as required.

From the overhead coal storage hoppers the coal is fed through special valves into auxiliary supply hoppers fixed to the top mouthpieces of the retorts.

In the event of the coal breaker and elevator being out of commission, small coal is fed to the overhead storage hopper by means of the skips and lift provided for handling coke.

To supply the gas for heating the retorts two producers are provided at the retort-house floor level at one side of the bench. The producers are arranged so that one producer may be shut down without interfering in any way with the working of the other producer. The gas from either of the producers may be taken to the heating flues of any of the retorts. The producers are of the step-grate type and each is constructed with ample grate area for the efficient heating of six retorts as well as for burning the



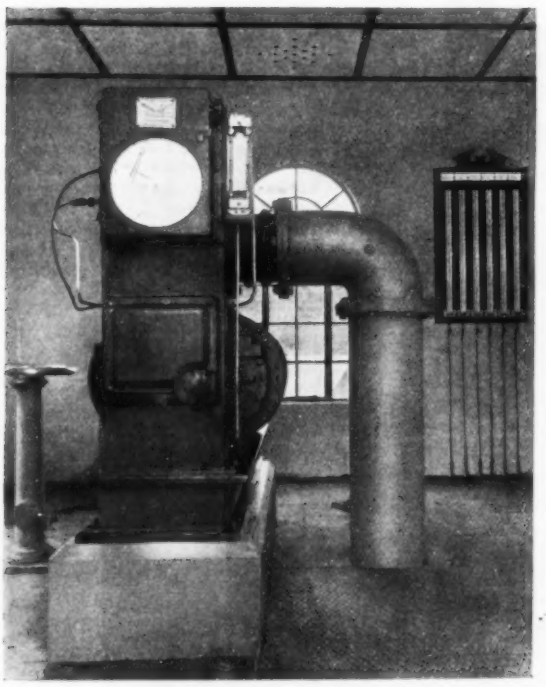
View of the New Woodall-Duckham Continuous Vertical Retort Installation.

additional amount of fuel required for a supplementary supply of producer gas to the waste-heat boiler. The step-grate eliminates the need for clinkering. The only attention required to keep the producer fire in proper condition is a periodical pricking up at intervals of four hours or longer, dependent on the class of fuel used.

The flow of waste gases from the combustion chambers of each retort is controlled by two dampers, one for each side of the retort. The waste gases from each group of four retorts pass into a common flue and out through a neck into the waste gas main.

The waste gas main conveys the gases either direct to the chimney or to a waste-heat boiler which is provided for utilizing the major portion of the heat contained in the gases. The waste-heat boiler is of the horizontal firetube return flow type, worked with induced draught by means of a turbine-driven waste-gas fan provided at the outlet to maintain the necessary draught for working the settings efficiently. The boiler is designed for a working pressure of 120 lbs. per sq. in. and is of sufficient capacity to deal with the waste gases from twelve retorts.

In order that the boiler shall give its maximum output of steam irrespective of the number of retorts in operation, provision is made so that a supplementary supply of producer gas can be mixed with the waste gases before they



Station Meter by W. C. Holmes & Co., Ltd.

are passed to the boiler, a supplementary combustion flue being provided.

When dealing with the surplus coke, the skips are elevated to the level of an outside (elevated) gantry, along which the skips are run and the coke is discharged on to fixed screens for separating the breeze from the large coke, the two sizes of coke being collected in storage hoppers of 20 tons total capacity arranged beneath the screens. These hoppers are provided with doors and chutes for feeding either into carts or into sacks placed on a platform at the side of the hoppers.

Ancillary Plant.

Annular Condenser.—This is of 750,000 c.ft. capacity per 24 hours, and consists of four heights each 29 ft. They are of steel, electrically welded throughout. The connections are of cast iron 18 in. diameter and are fitted with Walker's Inlet, Outlet, and By-pass Double Faced Valves.

Water-Tube Condenser.—This has a capacity of 500,000 c.ft. per 24 hours, the body consisting of a cast-iron shell 4 ft. square in cross-section by 13 ft. 8¼ in. between the tube plates. The tubes are of weldless steel. The connections are of cast iron, having Walker's double-faced valves, and are arranged so that the condenser may be by-passed when required.

Both the condensers and the valves and connections were made and erected by C. & W. Walker, Ltd., of Donnington, near Wellington, Shropshire.

P. & A. Tar Extractor.—This has a capacity of 1¼ million c.ft. per 24 hours. The connections and double-faced valves are so arranged as to permit the extractor to be by-passed when required. This tar extractor, with its valves and connections, was constructed and erected by C. & W. Walker, Ltd.

Livesey Washer.—This was also made and erected by C. & W. Walker, Ltd. It has a capacity of 750,000 c.ft. per 24 hours.

The Ammonia Washer was supplied by W. C. Holmes & Co., Ltd., of Huddersfield, and is of their new patent horizontal rotary brush type.

Purifiers.—There are four purifiers arranged in line, each 25 ft. long by 25 ft. wide by 5 ft. deep, in one box with three division plates. They are provided with Milbourne outside valves of the disc type, and on the inside with Milbourne reverse flow valves. Connections arranged in this manner, and provided with valves of these types, enable other purifiers to be added at either end at a later date with a minimum of disturbance to existing connections, and permit gas to have upward or downward flow at will. The covers are electrically welded throughout and are held down by screwed winged swing bolts, the joint between the angles and cast iron curbs being of india-rubber secured on the Milbourne-Beard patent principle. The purifiers, valves and connections, covers, sieves, and crane were made and erected by C. & W. Walker, Ltd.

Station Meter.—This is of the Holmes-Connersville positive displacement type, and was supplied by W. C. Holmes & Co., Ltd. The normal capacity is 1,500,000 c.ft. of gas per day, with a differential of ½ in. W.G., but the meter has a maximum peak load capacity of 3 million c.ft. per day, providing, therefore, for the increased output of the works anticipated in the near future owing to the rapid growth of Clacton and the increasing demand for gas appliances in the district. The meter is fitted with a recording instrument showing on one chart the variation in temperature, pressure, and make of gas throughout the 24 hours.

Bulk Supply.

Arrangements have recently been concluded for the supply in bulk of the whole of the gas required by the Walton-on-the-Naze Gas Company, and the Gas-Works at Walton has been closed down permanently.

The gas is pumped from the Clacton Gas-Works to the Company's gasholders at Kirby through a 6-in. diameter cast-iron main, approximately 6½ miles in length.

The gas is measured at the Clacton Gas-Works by a Holmes-Connersville positive displacement meter, of similar construction to the station meter, with a normal capacity of 36,000 c.ft. per hour. The meter is fixed on the inlet side of the boosters, and is provided with a special instrument for recording the temperature, pressure, and volume of gas passing through the meter.

There are duplicate 12 in. by 8 in. boosters, each of the heavy duty Holmes-Connersville type, one being direct coupled to a vertical steam engine, and the other driven by a variable speed electric motor, through a texrope drive.

The output of each booster can be varied by adjusting the operating speed up to a maximum of 500 r.p.m., at which speed each booster will deliver 36,000 c.ft. of gas per hour, at a pressure of 12 lbs. per sq. in.

The whole of the work in connection with the supply of the meter, gas boosters, and other appliances for the bulk supply scheme was carried out by W. C. Holmes & Co., Ltd.

Councillor W. J. Shingfield, Chairman of the Gas and Water Committee of the Clacton U.D.C., who with Mr. Sydney Francis, M.B.E., the Engineer and Manager, welcomed the large party of visitors, gave details of the extensions to the works, which he described as now "the most modern and up-to-date for gas production."

During the past 12 years their production of gas had risen from 63,000,000 to 190,000,000 c.ft. per annum. The population of Clacton-on-Sea during the winter was less than 20,000; but during the summer it increased to at least six times that number. Thus the Committee had to face a problem with five aspects. They had to provide plant and service which would supply a peak load for the population of a place nearly three times the size of Colchester; to supply gas at the lowest possible price; to legislate for future development and expansion; to arrange a supply for the surrounding districts; and to find the money necessary to pay for the work in times of national crisis. They had solved the problem satisfactorily; and they intended to supply gas in bulk to Frinton-on-Sea and Walton-on-Naze, neighbouring towns seven and nine miles away respectively, which would take 40,000,000 c.ft. a year.

After paying a tribute to the Council's Gas and Water Engineer and the Staff for their splendid service, Mr. Shingfield added that the Woodall-Duckham Company had provided an installation which on account of its cleanliness was highly suitable for a health and holiday resort. The process was con-

tinuous and automatic, all waste heat being utilized for making steam. The plant was so built that it could be added to.

Councillor Mrs. PERCY COLEMAN, Chairman of the Council, then performed the opening ceremony by setting in motion the coal supply to the vertical retort house.

A move was then made to the compressor house, where Mr. P. J. Pybus, C.B.E., M.P. for the Harwich Division, started up the plant installed by Messrs. W. C. Holmes & Co., Ltd., which boosts gas to Frinton and Walton.

Mr. PYBUS expressed his pleasure at being present on such a unique occasion. He said he had attended the opening of many electrical plants, but never had he been honoured by being asked to perform the ceremony of staring up a gas booster. He never regarded the Gas and Electrical Industries as antagonistic. He regarded them, not only unofficially but in his public work, as complementary. They were brothers assisting to make life easier and better for the people.

Mr. SYDNEY FRANCIS, replying to a vote of thanks to himself and his staff, said it was only by the co-operation of all concerned that they were able to carry out such alterations and extensions. He had every confidence in every piece of the new plant.

Responding to a vote of thanks to the Contractors,

Dr. E. W. SMITH, C.B.E., expressed gratification at the manner in which their work had been received, and paid a tribute to the thoroughness of the Engineer. As for electricity, no modern gas undertaking omitted to consider the use of electricity to the limit for its drives and mechanical gear.

Mr. R. J. MILBOURNE, J.P., in responding, also referred to gas and electricity, emphasizing the friendly co-operation and development that were possible when the undertakings were in joint ownership.

Mr. F. B. HOLMES claimed that they had seen one of the show plants in the country.

The visitors were entertained to tea in the new Town Hall by Mrs. Coleman, when Dr. Smith, on behalf of the Contractors, presented her with an inscribed silver rose bowl.

NEW PURIFIERS BY C. & W. WALKER, LTD., INSTALLED AT CLACTON-ON-SEA.

RUBBER JOINTS IN GAS MAINS

Investigation by the Research Association of British Rubber Manufacturers

Some tests have been made recently by the Research Association of British Rubber Manufacturers on gas main jointing rings made of rubber, after long periods of service. The recent results may be compared with those discussed by Walter Hole in the "JOURNAL" for Nov. 21, 1923, and June 25, 1924.

The present work was carried out on rings from Forster type joints lifted in the course of replacing the main during the summer of 1932 in the Gateshead district and presented to the Research Association by Mr. F. P. Tarratt.

The form of joint, which will be well known to gas engineers, is shown in figs. 1, 2, and 3, while figs. 4 and 5 show rings after about sixty and about two years' use respectively. Tests were made on some of the mechanical properties of these two rubbers, and they show that even after the longer period of use a considerable degree of strength and elasticity is retained.

The ragged edge of the older ring was exposed, through the soil, to air; the edge facing into the gas was thicker, more uniform, and less torn, being permanently slightly swollen by absorption of constituents from the gas. Sixty years of compression-deformation in this condition of exposure had produced plastic change to the new form. But in this new form the rubber still had power of elastic return. The annular space available for the rubber is some 6·0 mm. The released rings were 8·0 mm. thick (neglecting the ragged, thin edge facing the soil) showing that the rubber still possessed a power to return partially to the original form and must therefore have exerted a radial pressure on the walls of the annular space. Tests referred to below show that in the non-existent form—*i.e.*, after sixty years' deformation, with permanent change of shape, followed by release, the rubber is still highly elastic. The two years' used ring has obviously recovered its original (ribbed) circular section. The old and newer rings are not of the same composition. Results of a partial analysis are given below in Table I.

TABLE I.

Ring.	Sp. Gr.	% Ash.	Main Constituents of Ash.	Estimated Vol. % of Rubber.
2 years used	2·00	62·9	Mainly zinc oxide with some clay or other silicate, and barium sulphate	70
60 ,, ,,	1·38	33·3	Lead and zinc oxides, the latter predominating	80

The old ring was black but contained no carbon, the colour being due to the lead compounds.

Test pieces in the form of thin narrow ribbons and of flat plates 10-15 mm. square were prepared from the rings by buffing. With these the elasticity of the materials was investigated by extension and compression tests.

ELASTIC RETURN AFTER EXTENSION.

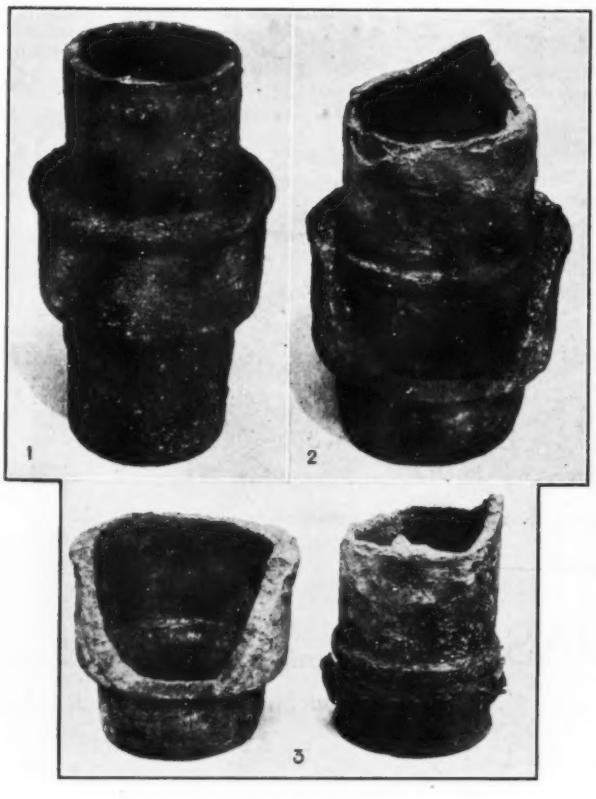
Strips with lengths of 100 mm. delimited between the ends were stretched to different extents for different times

and measured after release. The results are given in Table II.

TABLE II.

Material.	Original Length mm.	Stretched.		Recovered Lengths, mm.	
		To.	For.	In 1 Min.	In 1-2 Hours.
From :					
60 years' used ring	100	200	15 m.	109	101·5
,, ,, ,,	100	250	30 m.	..	102
,, ,, ,,	100	200	16 h.	108	104
From :					
2 years' used ring	100	200	15 m.	117	111
,, ,, ,,	100	250	30 m.	..	106
,, ,, ,,	100	200	16 h.	112	108

The test does not form a strict comparison between the old and new rings, as the two are not of the same composition. The newer ring, on composition alone, would be



Figs. 1, 2, and 3.

expected to have a rather lower power of recovery than the old one if the two could be compared as made. Disregarding these differences, the test brings out—

(1) the high power of elastic return possessed by the materials and particularly by the old ring;
(2) the greater effect of time on the behaviour of the old ring, whether duration of stretch or duration of recovery. This is in keeping with the combination of plastic and elastic properties which the ring manifested in use.

ELASTIC RETURN AFTER COMPRESSION.

Thin flat cuttings were compressed by means of G clamps between glass plates, and the original, compressed, and recovered thicknesses measured to 1/100 mm. Compression was to about 45% of the original thickness and was maintained for 20-22 hours. The figures, in mm., are given in Table III.

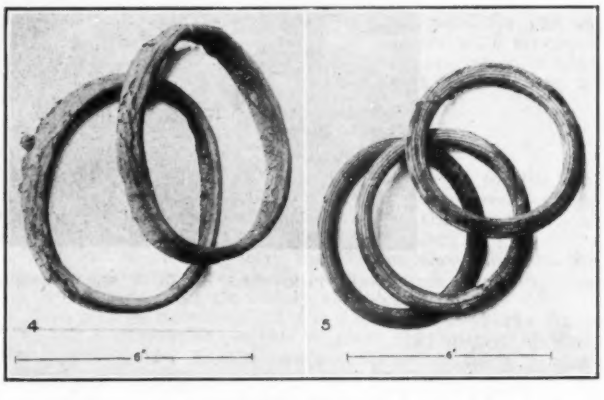
TABLE III.

Material.	Original Thickness.	Thickness after Release.		% Set.	
		5 Mins.	Many Hours.	5 Mins.	Many Hours.
From :					
60 years' old ring .	4·08	4·02	4·07	1·5	0·25
2 ,, ,, ,, .	6·42	6·09	6·18	5·1	3·8

Again, while both materials are good that from the old ring shows greater power of elastic return and again a relatively greater time effect.

RESILIENCY.

This was tested by measuring the height of rebound, from the rubber surfaces, of a falling weight in appropriate apparatus. The old ring was much softer than the new one, and, normally, the softer the rubber the higher the rebound. With these two rubbers the normal order was reversed, for the old rubber gave a rebound of 50 as against 70 for the new one. This again seems qualitatively in keeping with the elastic properties observed in the other



Figs. 4 and 5.

tests. In the latter the old ring showed a greater power of elastic return but took time to do so. In the rebound test the whole action is over in a fraction of a second.

EFFECT OF SOLVENTS.

Cuttings from the rings were immersed in benzene at 25° C. They absorbed nearly equally and about 3·5 times their own volume, as the swelling maximum in a test of about 400 hours' duration. As the materials were, before immersion, already impregnated with substances absorbed from the gas, the actual swelling figures cannot be usefully compared with those for normal new compounds. But it is worth noting that the test samples retained their form and showed no signs of disintegration.

In conclusion, it is observed that in this form of joint the exposure of the rubber to the gas and the duty demanded from the rubber are at a maximum, making the test, of such long duration, a very convincing one.

CONTINENTAL NOTES

A NEW CATALYTIC METHOD FOR THE DETERMINATION OF HYDROGEN.

An abstract, in "Brennstoff-Chemie," 1933, **14**, 115 (Mar. 15), refers to a paper by E. Biesalski and H. Giehmann, "Angew. Chemie," 1932, **45**, 767-9, describing the determination of hydrogen in gaseous mixtures by the catalytic oxidation of the hydrogen with oxygen in presence of platinum. The apparatus employed consists of a special type of porous porcelain candle with a glazed centre and porous ends which serve to break up the gas into fine streams. The two ends of the candle are impregnated, by suction, with neutralized chloroplatinic acid which is then reduced to platinum. As a source of oxygen, vanadium pentoxide may be used or the candle may be placed in a solution of an oxidizing agent (*e.g.*, sodium chlorate). A determination occupies 10 minutes, the reaction temperature being 80-90° C.

NEW SHOWROOMS AT RAYLEIGH

GAS LIGHT AND COKE COMPANY'S SERVICE IN ESSEX

Mr. H. W. BRENT, J.P., Chairman of the local Council, opening the Gas Light and Coke Company's new Showrooms at Rayleigh. With him are Sir David Milne-Watson, LL.D., D.L., Governor of the Company (right), and Mrs. Brent.

The Gas Light and Coke Company, with the aim of service to their consumers constantly before them, on Tuesday, March 21, completed a chain of showrooms right across southern Essex, linking up their London district with the recently acquired Southend Undertaking. This most recent achievement was the official opening of fine premises at the Essex village of Rayleigh, but a few miles from Southend.

The premises which occupy a prominent position in the High Street, are somewhat similar in general style to those recently opened by the Company at Billericay, in that the building, which is of considerable age, has been re-conditioned throughout without being materially altered structurally, thus preserving the old-world atmosphere which characterizes so many of these Essex townships. Mr. Walter J. Tapper, A.R.A., Past-President of the Institute of British Architects, was responsible for the design, decoration, and furnishing of the showroom.

While preserving this old-world air exteriorly, the showroom is arranged in the Company's well-known attractive style, resulting in an interior eminently suitable for the display of the representative selection of gas appliances to be seen there. The usual care has been taken to show a wide range of apparatus in the best possible surroundings, the various types being sectionalized in accordance with the Company's policy, sections being set aside for "concentrated" displays.

The residents in Rayleigh and surrounding districts will have an opportunity of inspecting a wide selection of gas and coke appliances, including modern enamelled gas cookers fitted with automatic control; gas fires in various finishes and six colours, to suit any style of furnishing and decoration; geysers, circulators, storage, and instantaneous water heaters, the latter supplying hot water at the turn of a tap in bathroom, scullery, or at the wash-hand-basin; gas wash-coppers; gas irons; portable heaters; refrigerators run by gas; gas pokers for lighting coke and solid fuel fires; coke boilers, and many other domestic labour-saving gas appliances. A special grate is also shown for burning "Cleanglow"—the new smokeless solid fuel.

The lighting of the showroom is most effective, being carried out by means of attractive glass-panel ceiling fittings, distance-controlled from switches set flush with the wall, which visitors to the premises are invited to operate for themselves.

A portion of the building is utilized as offiecs for the district staff, and these rooms are light, airy, and well equipped. A section of very fine old oak panelling, which was found in the original building, has been preserved and hung on the wall of the showroom, and gives some idea of the antiquity of the building.

In connection with the opening ceremony, a number of attractive leaflets were distributed to those present, which contained a plan of the showroom, and outlined in an interesting manner the many ways in which gas can be of assistance to the inhabitants of Rayleigh, giving at the same time some details of the size and activities of the Gas Light and Coke Company.

THE OPENING CEREMONY.

The opening ceremony was performed by Mr. H. W. Brent, J.P., Chairman of the Rayleigh Urban District Council, who was accompanied by Mrs. Brent, and supported by Councillors and many prominent residents in the neighbourhood. They were welcomed by Sir David Milne-Watson, LL.D., D.L., Governor of the Company, with whom were Mr. R. W. Foot, General Manager, Mr. T. Hardie, Chief Engineer, Mr. H. E. Ibbs, Chief Accountant, Mr. Stephen Lacey, Controller of Gas Sales, and Mr. W. A. Waters, the local Manager of the district, and other senior officers of the Company's Gas Sales Department, to whom is entrusted the care of giving efficient service to over 1,400,000 consumers in the Company's area of supply.

Preceding the actual opening of the new premises, tea was served at the Crown Hall, where Mrs. Brent was presented with a bouquet by Miss Doreen Denson, daughter of one of the Company's co-partners, who received from Mrs. Brent a gold brooch.

Sir DAVID MILNE-WATSON (Governor of the Company), on behalf of himself and the Court of Directors of the Gas Light and Coke Company, extended a hearty welcome to all present, and said that it was most gratifying that such a large number had attended to support the Chairman of the Urban District Council in his duty of opening the new premises. They might ask, said Sir David, why the Gas Light and Coke Company was opening showrooms in Rayleigh. The answer was a very simple one—namely, that the Company could not expect the inhabitants to travel all the way up to the Company's showrooms in London to see all that gas could do for them, so the Company decided that it was their duty to give all facilities for seeing what gas could do for their consumers in Rayleigh itself. Sir David said that he had a long connection with South-East Essex, and had a warm corner in his heart for the neighbourhood.

They had been assisted by Mr. Walter Tapper—one of the leading architects of the day—and the building was an admirable example of his work. In the new showrooms they would learn that gas could do a great many things indeed; it could light; it could heat; and it could prepare their meals; in fact the booklet which they had received would show them the thousand-and-one uses to which gas could be put. In the Gas Light and Coke Company's great district—which extended from Southend to Windsor—gas was utilized in no fewer than 14,400 factories—a striking proof of the vast number of purposes which gas could serve. He did not know whether the Chairman of the Urban District Council wanted Rayleigh to become an industrial centre; but if it did the Company would do their best to provide a fuel which would not pollute the fresh air of Rayleigh.

The best encouragement they could give the Company was to support their business, and so enable the Company to supply all their needs at very reasonable prices. The district in which they found themselves was one which was bound to extend, and

that was one of the reasons why they came down from London, the Company's original home. Another reason was the tendency to move from London and seek a home in the country; this made it necessary for the Company to follow their customers and open new showrooms further afield.

The Gas Light and Coke Company, continued Sir David, was the oldest gas company in the world, being over 120 years old. It was also the largest gas company in the world, and possessed many unique features. It catered for the welfare of its employees by means of the well-known co-partnership scheme. No fewer than 17,000 employees were co-partners, owning in all over a million pounds' worth of the Company's ordinary stock. They might ask, What concern is that of ours? The answer was that they had working for them men who were personally interested in the welfare of the Company, and who were therefore likely to do all that was possible for the convenience of consumers. The Company also catered for their employees' sport and recreation, which made them keen and healthy, and helped them to work well. These were just a few of the ways in which the Company provided for its men and officials in order that they might render better service to their consumers. In conclusion, Sir David heartily welcomed Mr. Brent, who had come there that day to open the new showrooms.

Mr. H. W. Brent, J.P. (Chairman of the Rayleigh Urban District Council), thanked Sir David for his interesting remarks. Rayleigh, he said, had been well served with gas ever since 1859 by the company which previously existed there. Without gas Rayleigh would not have extended as it had. These new showrooms would provide a tremendous amount of brightness for them in their High Street. The premises were built many years ago, and the Company had reconstructed them and turned them into a most handsome building.

He understood that the Company regularly employed 104 persons in their district, and not so very long ago they had been able to find work for several of the unemployed. [Applause.] In talking with some of the Company's employees, he had been struck by the way in which they had spoken of the Company; they always had a good word for the Company, which was greatly due to the welfare work. The staff and officers all pulled together. They had a Sports ground in this neighbourhood, and altogether there were 12,500 members in their whole Sports Club. The relationship between the Company and their local Council had always been most friendly and cordial. He had been watching the extension of the Company's mains in the district, and at the present time they had extended to Rawreth, which was one of their wards, but he hoped they would not take a short cut and put their pipes on pylons!

"In conclusion," added Mr. Brent, "I should like to thank Sir David and the Gas Light and Coke Company for entertaining us here this afternoon." [Applause.]

The company then proceeded to the new showrooms, and Mr. Brent, inserting a silver key in the lock, opened the main door, and, in declaring the building formally opened, he wished all success to the Company's new venture in Rayleigh.

Plymouth Make a Big "K.C.U." Effort

The Plymouth and Stonehouse Gas Company recently staged an effective exhibit of "K.C.U." water heaters, and we gather that consumers have been most interested to see what the "K.C.U." will do by way of providing hot water at the kitchen sink or wash-basin. The entire showroom windows were devoted to a series of specially designed displays, and the whole scheme was carried out in blue, orange, and gold. A fine display in the centre window, featuring a speed boat in conjunction with a number of "K.C.U." heaters, was flanked by decorative displays in the two side windows. The hot water section of the showrooms was also suitably arranged for the duration of this "K.C.U." campaign, and literature was available for all visitors to the showrooms. Special mention should be made of the Press campaign carried out by the Plymouth and Stonehouse Gas Company in connection with this display. An arresting 8-in. double-column advertisement appeared in the local papers almost daily throughout the week, and supplied the finishing touch to a well-considered and highly successful scheme.

The top photograph shows the general effect of the display. Of the lower photographs the one on the left is of the centre window, while that on the right is of one of the flanking displays.

THE MECHANISM OF COKE . . . FORMATION . . .

Recent Fundamental Work

By Dr. G. E. Foxwell.

Before commencing to deal with some of the recent ideas enunciated upon the subject of coke production, it is well to stress one rather important point in modern nomenclature. Many writers use the terms "coking" and "caking" as if they were synonymous; if that were so there would be no particular reason for using the term caking, since the older word "coking" has passed into the language by long usage. In point of fact the word "caking" should be confined to the laboratory operation, such as the production of the coke button in the crucible, whereas the term coking is reserved for the works scale operation. Many coals are known which cake, but do not coke.

It has long been known that the differences observed in practice between the coke-making powers of coals are not always reproduced in the laboratory crucible test. The crucible button may be swollen or flat, and the skilled observer can usually—though not always—deduce the coking quality of a coal from laboratory indications. It is impossible, however, to place coking coals in order of their quality by any specific measurement of the dimension of the button, whether that dimension be volume or height. This need not mean that laboratory indications cannot be obtained of relative coking powers of coals. Recent work indicates that the difficulty is due more to rate of heating than to any other single cause. The subject would perhaps be hardly worth pursuing at length were it not that the complete elucidation of the reason for this lack of reproduction of practical results in the laboratory throws a vivid light upon recent work on the carbonization of coal considered from the scientific point of view.

Attempts have been made in the past to base laboratory tests upon the coking powers of coal on the degree of swelling, it being known that most good coking coals yield a more or less swollen button in the crucible. Slater ("Fuel," VI., 82) has based a laboratory method of determining the relative coking power of coals upon the degree to which the several coals under examination swell when carbonized in a hard glass tube. The tube is placed horizontally, and is of the order of 1 in. in diameter. 20 grammes of coal is placed in a length of 6 in. of the tube and the temperature is raised at a pre-determined rate. In most instances the furnace is first heated to 300° C. before the tube containing the coal is inserted. In an experimental investigation into this method, the coals were heated slowly compared with the usual rate of heating in the crucible test. The temperature was raised by 10° C. per minute in the first series of experiments. At this rate it was possible to distinguish exactly between a good coking coal and a coal possessing only poor coking qualities. It was not possible, however, to distinguish between the several coals of good coking powers; all these coals appeared to be equally good. By heating at the much slower rate of 1° C. per minute a very much better differentiation between the several coals of good coking quality could be secured, and this indication was quite definite when the appearance of the coke was also taken into account.

Similar, but even more illuminating, results have been recently published by Shimmura and Nomura (J. Fuel Soc. Japan, XII., 132). Dr. Shimmura, who was formerly a student at Sheffield University, has used the Lessing coking apparatus in his work and has endeavoured to differentiate between the several types of Japanese coals by measuring the degree to which they swell during caking in that apparatus. He found the same difficulty in distinguishing between the several good coking coals, as was experienced by Slater, and like him, tried the effect of working at a slower rate of heating, with highly satisfactory results. In the normal Lessing procedure the temperature of the coke reaches 850° C. in 2 minutes and 900° C. in 3 minutes. In the next column are some of the results obtained on Japanese coals.

The significance of the figures is that there is evidently some change which occurs in the coal during the time it is being heated. This change may be a change in the chemical nature of the coal, and in that event would occur before the coal reached a temperature of incipient plasticity, say, 380° C.; it may also be due to the physical changes occurring in the plastic coal during the plastic stage. If the change is a physical one, it is more likely to have its origin in the rate of evolution of gas. The rate of gas evolution is profoundly affected by the rate of rise of temperature. When heating at 1° C. per minute the rate of gas evolution was 0·29 c.c. per gramme per minute, at 5° C. 0·64, and at 10° C. 0·99. The only objection to fixing on this as the cause for the difference in the results is the fact that this would equally affect all the coals and might not be expected to cause such considerable differences as were observed. It is of interest to inquire whether there are any chemical reasons for the differences between the coals according to the rate of heating.

Figures Give the Length of the Coke. Initial Length = 1.

Final temperature	600° C.			900° C.			Normal.
Rate, ° C. per min.	1	5	10	1	5	10	
Strongly coking—							
Miike coal	2·14	4·83	4·90	2·58	4·93	4·77	4·44
Takashima coal	1·32	2·71	4·19	1·42	2·99	4·07	4·95
Shinyubari coal	1·01	2·00	2·84	1·20	2·21	3·44	4·47
Weakly coking—							
Meinohama coal	0·77	0·74	0·81	0·67	0·70	0·68	1·03
Fushun coal	0·78	0·78	0·87	0·87	0·76	0·80	1·11
Onedo coal	0·73	0·82	0·72	0·72	0·72	0·73	1·17

Separating a Complex Mixture.

The methods used for the analysis of any complex mixture of organic compounds necessitate the sub-division of the mixture into its individual constituents. That decomposition may be effected by the aid of solvents, by fractional liquefaction, by fractional distillation, or in any of a variety of ways that appeal to the ingenuity of the analyst. In dealing with so apparently complex a mixture as coal it would appear that there is scope for considerable ingenuity. Actually the methods employed have been almost entirely confined to two—namely, the separation of oils by fractional distillation, always accompanied by an unknown degree of destruction of the original coal substance, and the separation of the constituents by solvents. The well-known and standard method whereby pyridine followed by chloroform is used has held the field against other methods for very many years since the use of pyridine was discovered by Bedson. Coal was thus split into α, β, and γ compounds, of which the γ-compounds alone possessed any indication of coking powers. For a long time it was believed that the coking power of a coal depended solely upon the possession of γ-compounds, and Illingworth laid it down that for a coal to coke its content of γ-compounds must not be less than 5½%. There are now too many instances known of coals possessing coking powers quite out of line with their content of these bodies for this and similar statements regarding the sole importance of the γ-compounds to have any real significance. These observations naturally encouraged further work into the composition of coal, work that was given a definite orientation by the paper contributed to the Royal Society by Dr. Marie Stopes, wherein the banded constituents of coal—Clarain, Vitrain, Durain, and Fusain—were first described. It is probably not over-estimating the importance of that paper to declare that it again brought investigators back to the fundamental fact which many of the more chemically-minded among them appeared to be in danger of forgetting—that coal is a mineral, and that to endeavour to discuss its chemical constitution without reference to its petrographic composition is to miss an obvious clue to the solution of the problem.

(To be continued.)

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

Theoretical Aspects of Benzole Recovery from Coal Gas*

By C. M. WEARING, Gas Light and Coke Company, Fulham.

(*Concluded from p.* 754.)

TEMPERATURE AND ABSORPTIVE CAPACITY.

The effect of temperature on vapour pressure has been alluded to in general terms previously, and it will be clear that an increase in the temperature of benzolized oil must result in an increased vapour pressure of benzole above it.

A. Edwards[13] has determined experimentally the benzene content of creosote oil at different temperatures when in equilibrium with gas with a benzene partial pressure of 6·1 mm. In a parallel column Hoffert and Claxton[14] have set out corresponding figures for a partial pressure of 6·5 mm., assuming proportional relationship between the partial pressure of benzene in the gas and its concentration in the oil. They also quote similar results for gas oil, adapted from data obtained by Wilson and Wylde[15], and these data are all combined in one table here.

TABLE 5.—*Temperature — Absorptive Capacity Relationship for Creosote and Gas Oil.*

(Hoffert and Claxton, "Motor Benzole," 1931, pp. 137-138.)

Temperature °C.	Benzene Concentration in Creosote in Equilibrium with Partial Pressure of Benzene Vapour in Gas of 6·1 mm. Hg. (Volumes Benzene per 100 Volumes Solution.)	Benzene Concentration in Creosote in Equilibrium with Partial Pressure of Benzene Vapour in Gas of 6·5 mm. Hg. (Volumes Benzene per 100 Volumes Solution.)	Benzene Concentration in Gas Oil in Equilibrium with Partial Pressure of Benzene Vapour in Gas of 6·5 mm. Hg. (Grams per 100 Grams Solution.)
0	..	..	8·95
5	9·80	10·43	..
10	7·37	7·85	5·25
15	5·75	6·12	..
20	4·62	4·92	3·20
25	3·75	3·98	..
30	3·05	3·25	2·05
40	..	..	1·30

Using the equation derived from Raoult's Law which has already been quoted, the absorptive capacity of an oil at a given benzene partial pressure but at different temperatures, can be calculated from the apparent mean molecular weight of the oil. The extent of the error due to "association" of molecules varies considerably with the type of oil however.

Although from the point of view of absorptive capacity the debenzolized oil should be as cool as possible, it should not be cooler than the gas or condensation of water will occur, and the usual compromise is to aim at a washer oil temperature about 2° C. warmer than the inlet gas.

THICKENING OF WASH OILS.

The use of wash oil for benzole recovery inevitably involves a gradual loss of efficiency which is largely attributable to accumulation in the oil of resinous substances of high boiling-point. From considerable controversy and much research work as to the cause of formation of these resinous bodies, the facts emerge that there are several causes always in potential or active operation, and that the degree of responsibility of each is governed by the existing conditions. Thus, in the circumstances which obtained in the investigation of each respectively, the following factors were proved by various workers to be concerned:

1. Oxidation by oxygen in the gas (and by air where feasible)[16].
2. Reactions with hydrogen sulphide, when crude gas is being washed[16 17 18].
3. Presence of tar-fog[19] and ammonia[20] in the gas.
4. Effects of heating and cooling of oil, namely:
   (*a*) Thickening due to increased proportion of high-boiling constituents.
   (*b*) Polymerization and cracking of constituents.

In most cases unsaturated compounds in the oil are believed to play a major part in the reactions.

The degree of nuisance caused by this thickening of oil depends upon a number of considerations. Amongst these may be mentioned the type of oil used, the rate of its replacement by fresh oil, the nature and concentration of impurities in the gas, the lay-out of the plant in question, and the temperature attained by the oil.

In considering the effect of the type of oil, a distinct disadvantage in the use of gas oil as compared with a coal-tar oil such as creosote is brought into prominence. The resinous substances just mentioned are soluble in the coal-tar oils and cause a thickening of the oil, with consequent increase of viscosity and average molecular weight, decrease of absorptive capacity, and formation of residues on distillation. In gas oil, however, the resinous bodies are not completely soluble, and in addition to the above disadvantages there are those due to the separation of these substances as a suspension. This suspension usually forms a sludge, which tends to be carried round in circulation with the oil, frequently creating a very stable emulsion of oil and water. The sludge or emulsion causes deposits on heated surfaces in the plant, impairing efficiency of heat transfer, and tends to block up the cooler. It will be evident that in designing benzole recovery plant for use with gas oil the incidence of difficulties and inefficiency due to sludging must be borne in mind throughout, and adequate cleaning facilities provided for dealing with such trouble as may be unavoidable.

In some cases cooler blockage has been prevented by periodically circulating hot oil through the tubes with the cold water shut off, but apparently the only efficient remedy for this deterioration of oil lies in replacement of all or a portion of it by fresh oil. It is usually found most satisfactory to replace a certain proportion of the oil regularly at short intervals, and though the amounts found necessary in practice vary very considerably by reason of other differences in plant operation, a generally recognized standard is of the order of one gallon of oil replacement per gallon of benzole made. This replacement is, of course, over and above the requirement of make up oil to compensate for oil losses to the gas and the benzole.

CHOICE OF WASH OIL.

[This formed the subject of an Appendix, not published in the "JOURNAL."]

RATIO OF WASH OIL TO GAS.

In operating benzole recovery plant it is highly desirable to maintain such constant rate of wash oil circulation as is found to give optimum results in benzole yield and quality. At first sight it might appear that fluctuations in benzole content of the gas would demand a varying rate of oil circulation but this is not the case. It will be remembered that by Henry's Law an increase in partial pressure of benzole in gas, in other words, an increase in concentration of benzole in gas, results in a proportional increase in concentration of benzole in the oil at equilibrium. So, for such dilute solutions, the absorptive capacity of the oil is independent of the benzole content of the gas.

The increase in temperature of wash oil on account of heats of condensation and solution of benzole is so small in practice as to be negligible, so that the temperature of the oil entering the washer may be considered to be that at which the washing occurs.

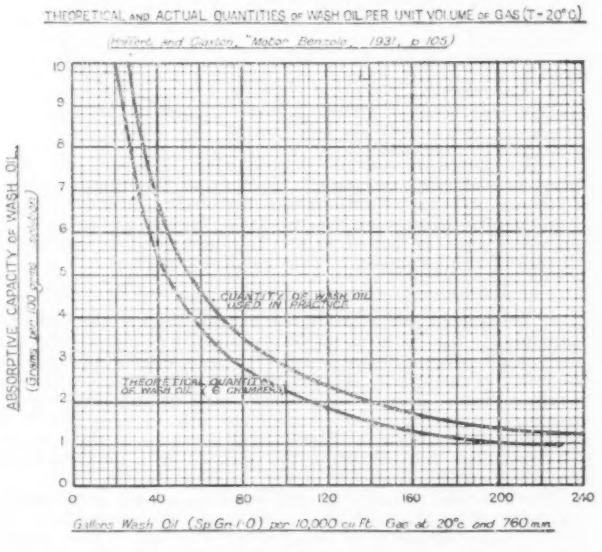
* From a paper before the London and Southern District Junior Gas Association, March 17, 1933.

From a knowledge of equilibria data relative to given partial pressures of benzole in gas at a definite temperature, the flow ratio of any wash oil to gas at any degree of recovery efficiency of the washer can be calculated. This has been demonstrated fully by Masson and McEwan[21], and more recently Silver[22] has evolved a convenient method, not yet published, of determining the relationship between washer efficiency, flow ratio, solute slip, and the partition factor for a washer with any number of bays. The rate of oil flow required in practice is usually assumed to be 25% in excess of the theoretical figure so calculated, to allow for such practical limitations as non-attainment of equilibrium and insufficient number of bays.

Using data obtained in the above manner, Hoffert and Claxton[23] have constructed curves indicating the theoretical and practical ratios of wash oil to gas for the whole range of absorptive capacities, assuming a 95% washer efficiency. It will be found that the practical ratio for a gas oil of absorptive capacity of 3% by weight is indicated as about 112 gallons per 10,000 c.ft. of gas washed at 20° C., assuming a specific gravity of 0·85. (Fig. 5.)

Although these curves relate to the absorptive capacity of oil for pure benzene instead of the mixture "Benzole" actually present in gas, the discrepancy involved is not considerable. The formula which was arrived at when dealing with Raoult's Law can be applied in calculating the relationship between absorptive capacity and vapour pressure for toluene and for xylenes respectively, when either is present alone in the gas. From curves obtained in this way, and a knowledge of the partial pressures of toluene and xylenes in coal gas, the saturation content of each in oil at the temperature being considered can be found. The relative values of these figures, when allowance is made for the actual concentrations of benzene, toluene, and xylenes in the gas, shows that the amounts of oil required to extract all the toluene and xylenes are respectively about one-quarter and one-tenth of that required for benzene.

FIGURE 5.



Thus, considering coal gas with partial pressures of benzene, toluene, and xylenes of the order of 6·0, 1·0, and 0·5 mm. mercury respectively (only approximate values), and using curves published by Hoffert and Claxton[24] for relationship between partial pressure and absorptive capacity (in oil of molecular weight 200), the results shown in Table 6 are obtained.

TABLE 6.—*Relative Volumes of Wash Oil at 20° C. Required to Remove from Coal Gas all the Benzene, Toluene, or Xylenes Respectively.*

—	Benzene.	Toluene.	Xylenes.
Approx. partial pressure in coal gas (mm. Hg.) . . .	6·0	1·0	0·5
Saturation content in oil at 20° C. (% by weight) .	3·3	2·2	3·2
Percentage by volume in coal gas	0·80	0·15	0·08
Relative volumes of oil to remove all of each constituent if alone (basis = 1 for benzene) . . .	1·00	$\frac{3·3 \times 0·15}{2·2 \times 0·80} = 0·28$	$\frac{3·3 \times 0·08}{3·2 \times 0·80} = 0·10$

An important application of these figures concerns the effect on benzole recovery of too small a flow ratio of oil to gas. Too slow a rate of oil circulation in the washer will evidently leave some benzene in the gas, since that constituent requires the highest rate of flow of the three. The amount of benzole recovered per ton of coal will, therefore, be less. And since it is benzene which is left in the gas, the composition of the recovered benzole will show undue amounts of toluene and xylenes and less benzene than usual, the proportions of all three tending to equal those given for saturation contents of oil in the foregoing table.

It is therefore important that the rate of oil circulation in a benzole recovery plant should not be allowed to fall below the theoretical figure at any time. It should be pointed out, however, that the figures given in Table 6 refer only to a temperature of 20° C.; at lower temperatures smaller quantities of oil will be adequate to effect the same amount of absorption.

C.II. RECOVERY OF BENZOLE FROM BENZOLIZED OIL.

Introductory.

The benzolized oil leaving the washers usually passes *via* a stock tank to an oil to oil heat exchanger and a steam-heated preheater, from which it enters the fractionating column of a still. The still is equipped with direct steam jets in the base, and sometimes also with indirect steam coils. A mixture of vapours and steam passes up the fractionating column and then through a system of fractional condensation which varies with different plants and is sometimes relied upon to effect most of the fractionation. The liquid benzole flows through a separator for removal of water before storage. The debenzolized oil returns to the washer by way of the oil to oil heat exchanger, a cooler, and a stock tank. To ensure a cold supply of oil to the washer and to reduce sludging difficulties at this particular point the cooler is frequently placed after the tank. Also partly because of sludge deposition, the oil to oil heat exchanger is sometimes omitted. The steam supply to the preheater should be controlled on the outlet of the coils so that a temperature corresponding to the maximum steam pressure is obtainable. Economy of direct steam to the still is thus secured.

Method of Distillation.

Since benzolized oil contains over 95% of wash oil, its boiling-point is too high to allow of benzole separation by simple distillation as a practical proposition. But the benzole can be recovered efficiently by introducing direct steam into the still, and so conducting a "steam distillation." Steam distillation depends on the principle that when two mutually insoluble liquids are thoroughly agitated the vapour pressure above the mixture will be the sum of the two individual vapour pressures, and that when this total pressure equals atmospheric pressure the mixture will boil at a temperature considerably below that at which either of the individual liquids would boil when alone. In the present instance the immiscible liquids are benzole and water (as steam), and their mixed vapours leave the fractionating column at about 100° C., although the boiling points of toluene and the xylenes are 110·7° C. and 140·3° C. (mean) respectively. Steam distillation of two immiscible liquids A and B results in a distillate whose composition is governed by the relationship:

$$\frac{\text{Weight A}}{\text{Weight B}} = \frac{\text{Molecular weight A} \times \text{Partial pressure A}}{\text{Molecular weight B} \times \text{Partial pressure B}}$$

To avoid an undue amount of water in the oil, with consequent emulsification and still priming troubles, it is essential that the temperature of the debenzolized oil leaving the still shall be above 100° C. (usually 105° C.).

Fractionating of Benzolized Oil.

The function of a fractionating column is to remove and return to the still the higher boiling components of the mixed vapours rising upwards, so that those vapours which leave the top of the column and are subsequently condensed and collected will be as rich as possible in the lower-boiling components. This is effected by ensuring counter-current flow between vapour ascending the column and condensed liquid descending it. The contact between the two phases should be as intimate and prolonged as possible, and with this object the columns are usually divided into a number of compartments by horizontal plates containing either perforations or a more elaborate system of bubbling hoods and pipes. In either case the design causes the vapour to bubble through a seal of condensate in each compartment, whereby condensation of the higher-boiling components takes place. It follows that the vapour rising through the column becomes progressively richer in the lower-boiling components.

The vapour evolved from benzolized oil will contain benzene, toluene, xylenes, unsaturated hydrocarbons, paraffins, &c., and although in practice it is the combined

benzene, toluene, and xylenes that one wants to separate from the oil, it will be sufficient to show the principle underlying fractionation if separation of a mixture of benzene and toluene is considered. When such a mixture is heated the vapour evolved will be richer in benzene than the liquid was from which it arose. Separation by this means can be best explained by reference to a diagram exhibiting the relationship between the boiling-point and composition of the liquid mixture and the composition of vapour in equilibrium with the boiling liquid. Such a diagram is illustrated in fig. 6.

The curve ALB represents the boiling-points (at 760 mm.) of all liquid mixtures of benzene and toluene ranging from pure toluene at A to pure benzene at B. From partial pressure-composition data the curve AVB is plotted, showing the vapour composition in equilibrium with any liquid mixture at its boiling-point. Thus if a mixture of 30% benzene, 70% toluene is boiled the temperature will be as represented at C and the vapour in equilibrium with such boiling liquid will have the composition indicated at D on the curve AVB at the same temperature. If now this vapour at D is condensed and heated by itself, it will boil at the temperature E and yield vapour of composition F. In the same way this by itself will boil at G, and so a series of these "steps" can be obtained. The liquid in the still will become progressively poorer in benzene and will boil at correspondingly higher temperatures, but separation will never be absolutely complete.

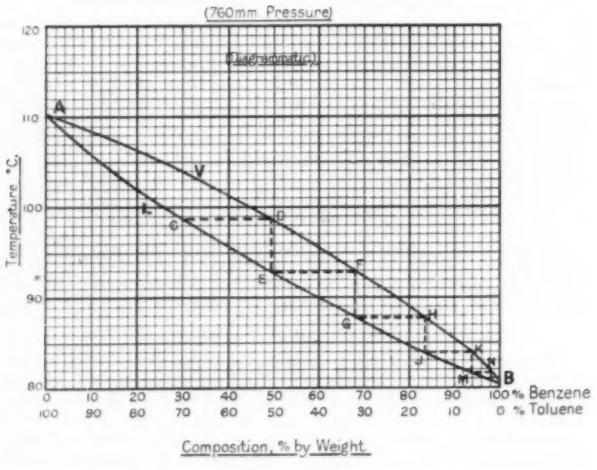
Application of these theoretical considerations to a fractionating column is made easier by regarding each compartment of the column as a separate still or boiler in which the liquid on the plate is being heated by the rising vapours, and the vapours thus evolved from the liquid are being cooled by the condensed liquid flowing downwards from the compartment above.

For perfect separation theory demands a very slow rate of distillation and consequent high ratio of condensate to vapour, but actually a compromise has to be made in the interests of steam economy and benzole output. Reference to fig. 7 will illustrate the procedure of controlled condensation which in practice takes the place of the complete condensation and re-vaporization at each stage which has been described.

Vapour of composition D is cooled (to temperature E), leaving uncondensed a vapour of composition F richer in benzene than is condensate E. Similarly the vapour F in the next compartment is cooled (to temperature G), leaving uncondensed a vapour of composition H, richer in benzene than is the condensate G. In this way a vapour of nearly pure benzene would be obtainable at the top of the column.

FIGURE 6

RELATIONSHIP BETWEEN LIQUID COMPOSITION, BOILING POINT & VAPOUR COMPOSITION FOR A BENZENE-TOLUENE MIXTURE



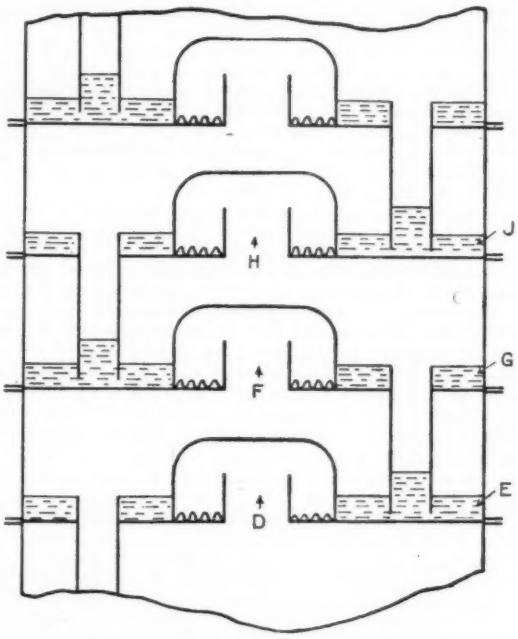
The progress of vapour up the column has been outlined, but it is necessary to consider also the progress of condensate downwards. Thus, the condensate G last mentioned will overflow into the compartment below containing vapour D condensing at temperature E, and by reason of the heat of condensation of vapour D, condensate G will re-vaporize immediately without any steam heat from the still. Thus the liquid richer in benzene (G) will be boiled by the condensing vapour richer in toluene (D), with the result that the vapour evolved will be richer still in benzene and the liquid richer still in toluene.

One of the factors influencing column efficiency is that of conductivity of the material used for the horizontal plates, and Warden[25] has recently published an account of the first stage of investigation into this relationship. This is for a column dealing with an alcohol-water system, and a report on a benzene-toluene system is promised in due course.

FIG. 7.

DIAGRAMMATIC SECTION OF PART OF A PLATE COLUMN.

(Showing only one bubbling hood per plate for simplicity.)



A fractionating column should always be heavily insulated outside with lagging. Apart from the obvious steam economy, efficient fractionating demands a steady flow of condensate throughout as great a length of column as possible, and control of this is best achieved by a definite degree of condensation at the top of the column.

Degree of Stripping in Distillation Plant.

If benzolized oil is stripped completely in the distillation plant, the crude benzole produced will contain an unduly high proportion of wash oil, thus adding to the cost of refining the spirit. However, it is not advisable to compromise more than a very short way in the direction of incomplete stripping of benzolized oil, or the result of washing with the oil will be such a decrease in the amount of benzole removed from the gas as will outweigh the economy in refining.

The benzole retained in partly stripped oil is poorer in benzene than the distilled benzole is, on account of the preferential removal of benzene in the still. This partly stripped oil containing poorer quality benzole will wash benzene out of the gas more efficiently than toluene and xylenes, and so will yield a benzole rich in benzene. As some benzole is left in the gas, however, the benzole yield per ton will have suffered.

Summary *re* Absorption Process.

Reviewing some of the practical issues that have been raised in connection with the absorption process, we find that the following generalizations can be made:

1. Gas entering the washer should have been well condensed.
2. The washer must be an efficient one of the multi-stage type.
3. Selection of wash oil to be used should take account of a number of physical properties of the oils available in order to effect the most satisfactory compromise (Appendix 3).
4. Oil entering the washer should have been almost completely debenzolized and should be only 1°-2° C. warmer than the gas.
5. Oil thickening tendencies should be controlled by steady replacement of used oil by fresh oil at an optimum rate found by experience.
6. The ratio of oil flow to gas flow in the washer should not fall below a minimum which depends on the absorptive capacity of the oil and the efficiency of the washer.
7. The temperature of debenzolized oil leaving the still must be above 100° C.

8. The ratio of condensate to distillate in fractionation should be as high as possible, consistent with due economy of steam and no serious restriction of benzole output.

The relative merits of the adsorption and absorption processes are outside the scope of this paper, and consequently have not been set out as such. Comparisons have been published from time to time, but are distinctly contingent upon local conditions.

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25. J.S.C.I., 1932, 51, 405T.
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28. "Motor Benzole," 1931, 134, 135.

Discussion.

The PRESIDENT (Mr. A. Tennant, East Surrey Gas Company), in opening the discussion, remarked that this subject of benzole recovery was one of the most outstanding developments of gasworks practice during the past year, and it would assume an even more important aspect in the future. They were fortunate in having listened to such a complete treatise on the subject as Mr. Wearing had presented to them. The Council of their Association had been anxious to include this subject in their programme for the session, and they could hardly have asked a more competent person to deal with it than Mr. Wearing. The importance of this subject of benzole recovery was manifested from the point of view of the economics of their own Industry, while from a national standpoint it could not be emphasized too much. These developments were of particular interest to their members, because the subject would affect them more in their duties in the future than it had done in the past. It was a specialized subject, and they were very grateful to Mr. Wearing for the trouble he had taken to give them the valuable information contained in his paper.

Mr. S. G. WATSON (Messrs. W. C. Holmes & Co.) congratulated Mr. Wearing on his able exposition of the physical chemistry of benzole recovery. While Mr. Wearing had outlined very clearly the working of a tower scrubber as a multiple stage washer, one must not overlook the difficulties inherent to distributing the washing medium over a large surface area. It was desirable that the washer should be of such design that in the event of benzole recovery being discontinued, the washer could be used for naphthalene extraction. In view of the comparatively small quantity of oil required for naphthalene extraction, it would be difficult to distribute the oil over the surface in a tower scrubber, and, consequently, in consideration of this point, the tower scrubber would be at a disadvantage in comparison with the two other types of washer described by Mr. Wearing.

FRACTIONATION.

A further point of interest to Mr. Watson was Mr. Wearing's exposition of the principles of fractionation. In benzole plants of recent design it had been found that improved results could be obtained by using a fractionating column containing a ring filling of the Raschig, Lessing, or similar types. The high efficiency of such column was discussed by Dr. R. Lessing in his paper before the Society of Chemical Industry (J.S.C.I., 1921, Vol. 40, p. 115 T.). Ring-filled columns had the advantage of offering a large scrubbing surface, which could be easily irrigated, and had not the disadvantages inherent to bubbling columns, in that the latter might become water-logged in the event of condensation due to excessive live steam and heat losses from the column.

Dr. S. PEXTON (Gas Light and Coke Company) said that he had been interested to hear the physical chemistry of the process of benzole recovery so clearly expounded—particularly because benzole recovery was a subject which could be studied theoretically, and results in practice accorded very closely with the conclusions arrived at as a result of theoretical study. The first section of the paper dealt with adsorption; this was a new process, and they might wonder what particular advantage there was in the process as compared with the older and more established oil-washing process. One advantage resided in the more complete desulphurization of the gas—*i.e.*, the removal of carbon bisulphide from the gas. In their case the sulphur content of the gas leaving the plant was of the order of 5 or 6 grains per 100 c.ft., while the sulphur content of the gas entering the plant was of the order of 30 to 35 grains. So they had there in that particular form of benzole recovery probably the most efficient process of desulphurization of coal gas—which would be a most important subject in the future, having regard not only to financial aspects but to the objectionable feature of the sulphur corrosion products in burners and geysers.

Mr. J. W. HAZELDON (Messrs. W. C. Holmes & Co.) questioned Mr. Wearing's statement that it was usually found most satisfactory to replace a certain proportion of the oil regularly at short intervals, and that the generally recognized standard was of the order of a gallon of oil replacement per gallon of benzole made. He inquired if this had actually been found necessary in practice.

Mr. C. A. DEAS (Hertford) inquired as to the question of gum formation in the gas and the result of benzole recovery on this matter.

THICKENING OF WASH OILS.

Mr. F. O. HAWES, A.M.I.Chem.E. (Tottenham), referred to Mr. Wearing's remarks relative to the thickening of the wash oils. He indicated that with the use of gas oil as distinct from a coal tar oil such as creosote this thickening was less. In washing for naphthalene the usual practice was to use gas oil, and these troubles with gum formation resulted from the use of this gas oil. He asked if Mr. Wearing considered that the use of gas oils would lessen their gum trouble, which was becoming a serious item.

Mr. F. W. ROBINSON (Wandsworth) inquired what steps were taken, as the activity of the carbon fell off, to maintain the calorific value of the gas.

Mr. J. H. GOLDSMITH (South Suburban Gas Company) said that he appreciated Mr. Wearing's concluding paragraph regarding the relative merits of the two processes—namely, adsorption and absorption—but he felt that the paper would be incomplete from their reference point of view if a comparison were not given. Mr. Wearing might, perhaps, like to give them some comparative figures as to what they might expect from the two processes regarding the amounts of benzole to be recovered per ton of coal carbonized.

Mr. S. H. MILES (Reading) asked if Mr. Wearing could tell them something of the inhibitor process. This was a very important matter, especially from the commercial aspect, and he did not know whether it was a practical proposition, or whether it was purely experimental. He also inquired as to the actual position of the tower scrubbers. It was usual practice to place the scrubber after the purifiers, but in one installation he knew of it was placed before the purifiers, and he believed this was the usual practice on the Continent. He suggested that with the scrubber before the purifiers, they must get the wash oil contaminated with H_2S, and he would like Mr. Wearing's opinion on this point.

THE AUTHOR'S REPLY.

Mr. WEARING, replying to the discussion, said that he would like to thank Mr. Tennant for his kind remarks. In regard to the tower scrubbers, he was interested in what Mr. Watson had said relative to the advantages of Lessing rings as a filling which presented a large surface without holding up too much liquid, and his observations on the use of tower scrubbers for such small oil flows as are required for naphthalene washing would be of interest to all.

Regarding the matter of oil replacement mentioned by Mr. Hazeldon, it was admitted that there was a diversity of opinion on this subject, due, as stated in the paper, to differing conditions of plant operation. At four works with which he had had some dealings reports were given as to the rate of replacement and the effect of sludge trouble; and in one case the figure was 100% of the benzole yield—without any sludge trouble. At another works the figure was 20% without trouble; at another 50% *with* trouble; and in another 7% *with* trouble. There was a growing belief that in order to be free of sludge trouble it was necessary to replace about a gallon of oil per gallon of benzole made.

In regard to the remarks relative to creosote and gas oil, the point was that creosote dissolved the solids, while the gas oil did not, and although one experienced thickening in both cases, in the former instance one had less trouble because there was no sludge or emulsion formed. There had been a tremendous amount of work done recently in regard to this matter.

In reply to Mr. Robinson's query relative to the control of the calorific value of the gas after passing through the active carbon plant, Mr. Wearing said that the point was that there was more than one filter, and these were taken out of the circuit of the gas in sequence. An active carbon filter was taken out of circuit and steamed directly it reached "break-point" (say, 5% slip of benzole), there being sufficient other filters provided to cope with the whole make of gas. On the ideal plant one always had a large proportion of the carbon bed filters in action at full working efficiency, and in large plants this involved working to a somewhat complex cycle of sequences.

RELATIVE MERITS OF ACTIVE CARBON PROCESS.

Replying to Mr. Goldsmith's question regarding the relative merits of the active carbon and oil washing processes, Mr. Wearing said that if he had understood the query correctly it would be answered by a statement of some of the relative merits and disadvantages of the active carbon process as compared with the oil washing process. These, as stated in the paper, depended to some extent on individual circumstances, but, broadly speaking, they were as follows:

Advantages.	*Disadvantages.*
1. Recovery efficiency higher	1. Process is intermittent, with rather higher labour and supervision charges on small plant.
2. Sulphur compounds reduced much more completely.	2. Efficiency of the carbon has in some instances been found to be definitely impaired if gas is not completely washed for naphthalene beforehand.
3. Benzole produced is uncontaminated with wash oil.	3. Rather higher back-pressure to the gas, necessitating boosting in some cases.
4 Saving in power, cooling water, and steam.	
5. Smaller temperature coefficient, giving higher efficiency when atmospheric temperature is high.	

Several people had mentioned the question of gum deposition from gas, and though he was acquainted with the general results of some of the recent research work on this subject, he did not feel authorized to discuss them. He would, however, just mention that *one* factor which had been shown to be involved had no connection whatsoever with benzole removal from gas.

In reply to Mr. Miles, Mr. Wearing said that the use of certain substances (such as trieresol) as inhibitors of resinification of benzole on storage had been for some time now a very practical proposition, and its adoption was extending. Over and above the proved efficiency of this inhibitor, the reason for this success lay in the retention in the benzole of useful unsaturated hydrocarbons which were formerly removed (and lost) in the acid-washing process of refinement. He had no first-hand knowledge of washing of crude gas for benzole before purification.

Vote of Thanks.

The President, in proposing a hearty vote of thanks to Mr. Wearing for his paper, said that this treatise was a valuable contribution to the Transactions of their Association, and would be looked upon as a work of reference on the subject.

Mr. H. C. Sims, A.M.I.C.E. (South Metropolitan Gas Company), seconded the vote of thanks, which was carried by acclamation.

Australian Gas Institute

Presidential Address of Mr. S. J. Janes, Secretary, North Shore Gas Company, Ltd, Sydney

Efforts to balance budgets by the Commonwealth and States have necessitated the restriction of raising overseas loans, which have in the past been used to make good deficiencies between revenue and expenditure, and to provide capital for new works.

The curtailment of these loans increased unemployment, and in order to make good deficiencies the Government was compelled to impose additional taxation—not only on individuals, but upon industries. This excessive taxation has had the effect of limiting the spending-power of the individual and restricting the development of industry; and the added costs of production have made it impossible, in many cases, for industries to carry on advantageously. Restriction in the development of industry has resulted in the closing of factories and business premises, with consequent decrease in the use of industrial gas. With the diminution of business there has followed loss of profits and dividends, which loss has in turn affected the spending-power of the people.

Vacant houses, and a lower standard of living, are the direct results of unemployment, and have a vital effect upon sales in the industry.

In the North Shore Gas Company's area a recent count showed 3400 vacant houses. These had, a few years ago, been occupied, and the approximate consumption of gas by the occupants thereof was 75 million c.ft. per annum.

The payment of the dole to the unemployed in this State has further affected the position of the wage-earner, on whom a tax is levied to provide for it. Thus, there were two sections of the people whose spending-power was reduced—first, those to whom the dole was paid, and, secondly, those who were obliged, by the imposition of the unemployment tax, to provide the payment.

In some cases, labour has been rationed to obviate the necessity for dismissal; and the reduction in, and, in many instances, the entire loss of, return from investments in real and personal property, has necessitated a general practice of economy in the use of gas for domestic as well as industrial purposes.

The effect of the financial crisis on the main Metropolitan Gas Companies of the Capital Cities of States in the Commonwealth is instanced by the following figures from 1928. The year 1929 may be regarded as the peak-period. The statement shows the general decrease in sales of gas, and in the number of consumers; and, in most cases, the cessation of developmental operations, as indicated by the absence of increase to any extent in miles of mains laid.

It will be noted from the foregoing that the City of Perth is the only undertaking showing, in 1931, an increase in sales over 1930. Although figures indicate a serious reduction in the sales of gas by all the other Companies, recent returns show that it is reasonable to assume that the lowest depth of depression has been sounded, and that there is a decided movement towards a return to normal conditions. In the Sydney-Metropolitan area the sales for the past few months show an increase over the corresponding periods of last year.

There is, of course, considerable leeway to make up to reach the volume of business transacted in 1929.

The depression has also been responsible for a considerable increase in the amount of bad debts resulting from the operations of gas companies. The following figures show the extent of the increase in this connection.

Particulars of Bad Debts Written off by Metropolitan Gas Companies in the Capital Cities of Australia.

—	1928.	1929.	1930.	1931.	1932.
	£	£	£	£	£
Australian Gas Light Company	4,470	4,428	5,501	9,916	13,608
North Shore Gas Company, Ltd.	1,116	1,998	1,056	1,667	2,225
Manly Gas Company	159	171	235	155	322
Melbourne Metropolitan	3,831	5,812	6,019	11,248	12,035
Adelaide Gas Company	1,650	1,668	2,933	8,365	2,655
Brisbane Gas Company	539	499	665	461	306
South Brisbane Gas Company	338	326	312	203	425
Newcastle Gas Company	388	429	657	851	1,245
	£12,491	£15,331	£17,378	£32,866	£32,821

Showing an increase of 162% in the amount written-off as compared with 1928.

The amount actually written-off by the City of Perth is not available, but the reserve for gas bad debts is shown as £120 in 1929 and £900 in 1931.

By reason of the difficulty experienced in debt collecting, it has been found necessary to adopt special measures, which entail as little hardship as possible on the debtor.

In addition to increased staffs in the debt collecting de-

Table showing Gas Sales, Miles of Mains, and Number of Consumers, from the Leading Metropolitan Gas Companies in the Capital Cities of Australia.

—	Sales of Gas in Thousand Cubic Feet.				Miles of Mains.				Consumers.			
	1928.	1929.	1930.	1931.	1928.	1929.	1930.	1931.	1928.	1929.	1930.	1931.
Australian Gas Light Company	6,912,128	7,143,719	7,005,959	6,330,382	1944	1999	2016	2020	241,015	250,905	248,472	247,882
North Shore Gas Company, Ltd.	911,156	943,601	916,813	829,495	226	235	245	251	34,006	35,197	34,040	33,996
Newcastle Gas Company	451,556	459,457	436,673	383,122	210	212	213	213	20,669	21,091	21,238	21,106
Melbourne Metropolitan	4,156,151	4,222,391	4,032,719	3,802,786	1318	1340	1354	1358	185,465	185,465	187,265	185,752
Brisbane Gas Company	664,999	650,634	610,122	609,331	273	297	310	314	22,730	23,588	24,177	24,750
South Brisbane Gas Company	204,000	201,000	197,000	187,000	102	110	120	136	9,009	9,311	9,518	9,833
Adelaide Gas Company	1,237,208	1,274,905	1,119,746	952,376	839	864	872	873	64,306	65,567	65,518	65,111
City of Perth	241,127	278,324	311,918	315,894	203	249	274	280	11,763	14,385	16,278	16,359
Hobart Gas Company	139,297	136,613	127,003	120,328	100	101	102	102	9,161	9,315	9,324	9,214

Seattle Public Library

partments, Sydney Metropolitan Companies adopted, about two years ago, the practice of installing prepayment meters in cases where consumers were unable to pay accounts in arrears, but were prepared to reduce such arrears by the payment of instalments—paying in the meantime for gas used under the prepayment system.

The Companies thus retained the debtor as a consumer, and at the same time enabled him to liquidate a debt which, in all probability, would have become irrecoverable.

The justification of the procedure is borne out by the fact that, in the Company I represent, sales under the prepayment system have shown a considerable increase.

This increase, which continues to be maintained, is shown in the figures submitted:

Year ended December, 1931 = 79,630,000 c.ft.—an increase over the previous year of 6%.

Half-year ended June, 1932 = 44,872,700 c.ft.—an increase over the corresponding period of the previous year of 25%.

It must be remembered that, while there has been increased revenue from the supply under the prepayment system, the method has involved additional capital expenditure for the purchase of extra prepayment meters to cope with the demand.

A gradual increase in sales of gas was almost invariably experienced by all gas companies up to the year 1929, and the position seemed to justify the view that the increase would be permanent. This created the necessity for extensions of plant to meet the requirements of consumers.

In some cases extensive additions were carried out in anticipation of a continuance of the growth of business. This expenditure has in such cases greatly increased capital costs, and in many instances plant has been erected greatly in excess of present requirements. Reduction in capital costs cannot, therefore, be expected until a considerable proportion of this reserve plant is put into operation, as a result of an increased demand for gas.

Gas Unit.

In the 1929 Transactions, Mr. J. Banks, one of your members, advocated the principle of selling gas by heat value, and urged the adoption of a unit of 3412 B.Th.U.

The advantages of selling gas on this basis were so apparent that representations were made for its inclusion, and it was subsequently included in the Gas and Electricity Act passed by the Government of New South Wales in March last.

From Oct. 1 last the new basis of charge came into operation in respect to those Companies mentioned in Schedule 1 of the Act.

Progress of the North Shore Gas Company.

As this is the Jubilee Year of the North Shore Gas Company, Ltd., I may be permitted to make a few remarks regarding its history and progress.

In the year 1875, Messrs. Charles Watt and James Walter Fell obtained authority from Parliament to supply with gas the Municipalities of East St. Leonards, Victoria, St. Leonards, and North Willoughby, and works were erected at Neutral Bay. The Act under which they obtained their Charter is cited as the North Shore Gas Act of 1875.

In 1882 the North Shore Gas Company was formed, and purchased the rights held by Messrs. Charles Watt and the Trustees of James Walter Fell.

The original Neutral Bay Works have been enlarged from time to time, until the manufacturing capacity reached 2½ million c.ft. per day. Increased consumption necessitated the erection of additional plant, and as the space available at Neutral Bay was inadequate, the erection of works at a site previously purchased at Oyster Cove was commenced in 1912. Glover-West vertical retorts were installed, and in 1917 the new works were completed and in operation. These works have also a capacity of 2½ million c.ft. per day. At each works there is a carburetted water gas plant capable of producing 500,000 c.ft. per day.

Holder Plate Corrosion.

The No. 1 Holder at Neutral Bay was erected in 1887, and is still in use without having been re-sheeted. Wrought-iron sheets were used in the construction of this holder.

The No. 2 Holder at Neutral Bay was erected in 1902; one lift and crown had to be re-sheeted, on account of corrosion, in 1922, after twenty years' service.

No. 3 Holder at Neutral Bay was erected in 1911. It was found necessary to re-sheet two lifts and the crown in 1925, due to corrosion, after fourteen years' service.

Mild-steel sheets were used in the construction of both of these holders. They were re-sheeted with "Armco" iron.

No. 1 Holder at Oyster Cove, constructed of mild-steel sheets, was erected in 1917. On account of internal corrosion it had been necessary to repair temporarily the crown sheets and side plates. Over two hundred patches, principally in the crown of the holder, were placed in position prior to 1929. As this holder was in such a bad condition, it was deemed advisable to purchase an additional holder, so that repairs could be effected. After extensive inquiries were made in England and through the Technical Press as to the most suitable type, it was decided to erect a waterless holder, which has a capacity of 2½ million c.ft. per day. This holder was put into commission on July 1, 1930, and has given every satisfaction.

In the previous re-sheeting of holders "Armco" iron was used, but experience has shown that this iron does not possess the corrosion-resisting qualities anticipated.

After exhaustive inquiries, we have decided to use copper bearing steel in the re-sheeting of the No. 1 Holder at Oyster Cove. The tender has been accepted in this connection. I might mention that this iron is also being used in connection with the re-sheeting of a gasholder at Manly.

While on the subject of gasholders, I might mention that the Manly Gas Company has instituted a new departure in gasholder construction, as far as Australia is concerned, by erecting a Hortonsphere. This holder, which was put into commission in 1931, has a capacity of 250,000 c.ft. at 50 lbs. pressure. I understand it is giving complete satisfaction.

A Comparison.

Recently in the "Daily Telegraph," London, an article appeared under the ægis of the British Commercial Gas Association on the "Amazing Progress of Gas," in which it is stated that:

> The British Gas Industry has more than doubled its output since 1902. Its output has increased by 45% since the war, and during the same period the number of gas consumers has risen by 32%.
>
> There are over 10,000,000 gas consumers in the British Isles.

The following are the comparative figures for Australia:

> The Australian Gas Industry has more than quadrupled its output since 1902.
>
> Its output has increased by 79% since the war, and during the same period the number of consumers has risen by 81%.
>
> There are over 764,000 gas consumers in Australia.

The total output of gas in the British Isles, as published in the official reports, is as follows:

In Cubic Feet.

1902.	1914.	1925.	1929.	1931.
Millions. 159,500	Millions. 229,150	Millions. 294,756	Millions. 321,616	Millions. 331,610
Percentage increase over previous period	44	28	9	3

The corresponding figures for Australia are:

In Cubic Feet.

1902.	1914.	1925.	1929.	1931.
Millions. 4,278	Millions. 10,514	Millions. 18,359	Millions. 20,655	Millions. 18,885
Percentage increase over previous period	145	74	12	8*

* Decrease.

The enormous increase in Australia between 1902 and 1929 will be noted.

From a comparison of the 1929-1931 periods, it would seem that the "depression" has not affected the Gas Industry in the British Isles as it has in Australia.

European Gas Company, Ltd.

ANNUAL GENERAL MEETING

The Annual General Meeting of the Company was held on Tuesday, March 21st, in the Middlesex Room at the Great Eastern Hotel, Bishopsgate, London, E.C. 2. Mr. FRANK H. JONES, M.Inst.C.E. (Chairman of the Company), presided.

The GENERAL MANAGER AND SECRETARY (Mr. F. Eliot Williams, O.B.E.) read the notice convening the meeting, and the Auditors' report.

The Directors' Report and Statement of Accounts for the year ended December 31st, 1932, were taken as read.

The CHAIRMAN then spoke as follows: In accordance with the wish expressed at the last general meeting, a statement was compiled and sent out to the stockholders with the final dividend, giving a summary of the Company's revenue accounts for the previous ten years. From letters which were received from stockholders, we were pleased to know that this additional information was appreciated. This year we have sent out with the report and accounts a revenue account giving similar information in respect of the year 1932 in a slightly more elaborate form. We have also made certain modifications to our balance-sheet and profit and loss account, with a view to providing as much information as possible, and we hope that the accounts in their new form will meet with the approval of our stockholders. The revenue account and profit and loss account are drawn up in as simple a manner as possible, and the figures speak for themselves.

With regard to the balance-sheet, it will be seen that the Renewals and Contingencies Fund has been reduced from £155,793 to £91,023, due to expenditure on account of the new works at Roche Maurice not chargeable to capital, and to loss on exchange; the increase in the bank loan is also due to the expenditure on the Roche Maurice Works at Nantes.

Considerable further expenditure will be necessary this year and in 1934 before those works are completed; and it will not be possible to take complete stock of the situation until the site of the old works can be vacated and the land, which is situated in a valuable position in the centre of the town, can be disposed of. Meanwhile our bankers are providing the necessary accommodation against the security of our investments.

The only other figure in the balance-sheet which shows any striking variation from the normal is that of sundry creditors in London, which is swollen on this occasion by provision which has been made for liabilities in respect of arrears of French taxation; these have been under discussion for some considerable time, and a point has now been reached where there is sufficient agreement to make it prudent to reserve a sum to cover all possible claims. This provision is, of course, also reflected in the Revenue Account, where the item Rates and Taxes is also swollen for the same reason.

As far as can be judged, full provision has now been made in the accounts for all taxation, both English and French, which may be payable in respect of the profits up to Dec. 31, 1932. In future each year will only be called upon to bear the amount of taxation attributable to that year's profits, and a further step to eliminate possible variations in the balance-sheet profits has thus been taken.

On the other side of the balance-sheet you will see that, in consequence of the general rise in gilt-edged securities, the Company's investments, which stand in the books at a purchase or written-down value of £254,070, were actually worth, on the basis of Stock Exchange quotations, £328,728 at Dec. 31 last.

The year on the whole has not been unsatisfactory. We have reaped the benefit of certain economies and improvements in working which have resulted from the introduction of a more efficient organization, and the year has, of course, also had the advantage of the conversion of the franc profit at a more favourable rate of exchange.

It is true that the consumption of gas is very slightly down, but it would not have been surprising, having regard to present economic conditions, if the diminution had been much greater.

The fact that we have held our own to this extent may legitimately be ascribed to the efforts of our commercial departments, which are beginning to justify their creation. We have increased the number of our consumers and have considerably augmented the number of apparatus sold and placed on hire. And there is definite evidence that gas is beginning to make its mark as a convenient fuel for industrial purposes. Special efforts have been made to attract industrial consumers by studying their individual requirements, and by offering substantial discounts for large consumptions and special uses of gas.

A further department in which progress has been made is in the sale of gas at reduced prices for central heating installations. The convenience and cleanliness of such installations is gradually being realized by the consumer, and an increasing business is being done in this direction. The rather optimistic view taken at the end of 1932 is so far confirmed by the results of 1933 to date, which show an increase of consumption of 2½% over the 1932 figures.

There is much to be done in France in the development of the use of gas—not particularly at the stations of the European Gas Company, but generally—and it is only now that we are beginning to see the result of ten years' hard work. It is an uphill fight all the time, and no relaxation of effort is permissible; but the business is there and with the co-operation of a loyal and hard-working staff there is no reason why the sale of gas should not be steadily developed for many years to come.

We do not look for any sudden or spectacular accession of consumption, but we do think that, given reasonable economic conditions, we are justified in looking forward to a period of steady increase of business.

The late Chairman has on several occasions referred to the re-organization of all departments of our activities with a view to securing greater efficiency, and we should now be entering upon a period when the results of that re-organization may be expected to make themselves felt.

In view of this fact and of the advantage derived from the remittance of franc profits at a more favourable rate of exchange, the Directors felt justified in paying a slightly higher interim dividend, and in recommending an increase in the final dividend, with the result that if this is approved by the stockholders the dividend for the whole year will be at the rate of 6%, free of tax, against 5½% for the previous year.

When exchanges have assumed a greater degree of stability it is the intention of the Board to put the dividends on a more level basis by paying an interim dividend of the same amount as the final. But it would be unsafe to make this alteration until the exchange position is more settled, and when the alteration is made it must not be assumed that an increase of the interim dividend for this purpose is necessarily to be followed by an increase of the final dividend.

The new works at Roche Maurice, Nantes, are now taking shape, and before very long we should be in possession of a first-class modern works which will allow us to manufacture gas under much more favourable conditions than is possible at present, and this is our largest station; at Boulogne the modernization of the works is practically completed, and when the remaining horizontal retorts have been replaced by a second section of vertical chambers the works will be thoroughly up-to-date.

The necessity of adequate showroom premises with suitable accommodation for the staff on the commercial side of the undertaking is becoming every day more and more apparent, as it is in this country, of course; and for some time past the Board have not been satisfied that all our present premises are either suitably situated or adequate in accommodation.

The opportunity having occurred at Boulogne to secure premises which are not only very well situated but which offer ample accommodation for the purposes required, the Board disposed of the lease of the existing small showroom and purchased the new premises in the Grande Rue; the showroom and commercial staff have already been installed there, and the Board are satisfied that these premises are not only a valuable asset, but will prove of great assistance in the further development of our business.

The two top floors, which are not at the moment required by the Company, have been converted into flats, one of which has already been let on satisfactory terms.

The report mentions the loss which the Company has suffered by the resignation of Dr. Charles Carpenter, who had been a Director since 1914 and Chairman since 1925, and I am sure, as are my colleagues, that you would like to place on record your appreciation of his great services to the Company. [" Hear, hear."] My colleagues have elected me Chairman, and Mr. A. M. Paddon has been elected Deputy-Chairman.

The vacancy on the Board was filled by the election of Mr. S. H. Le Roy-Lewis as a Director—an appointment which I shall ask the stockholders to confirm. The considerations were that the new Director should be a youngish man, that he should be able to speak French fluently, and that he should be one of whom the stockholders would approve. Mr. Le Roy-Lewis is a Director of the Imperial Continental Gas Association and has a great many interests in France and on the Continent generally.

The report also mentions the resignation, through ill-health, of Mr. G. C. Goldsmid, who had been an Auditor since 1916. I regret to have to say that his death took place on March 10.

In pursuance of the policy which has already been approved by the stockholders, of filling the auditorships as and when they become vacant by professionally qualified auditors, the Board have filled the vacancy by the appointment of Mr. D. M. Touche, a partner in the firm of Messrs. Geo. A. Touche & Co. The Company's Auditors are now both professional accountants.

Finally, before proposing that the Report and Statement of Accounts be adopted, I would like to say this—and, indeed, I feel that I ought to say it—that having been connected with the Company for nearly thirty years, and having last year visited each works and every piece of property of the Company, I feel that the future of the Company as a gas undertaking is beyond doubt a very good one, and the works and personnel are both better equipped to meet the future than at any time since I have known them.

I propose, and I ask the Deputy-Chairman, Mr. Paddon, to second:

> That the Report of the Directors and the Statement of Accounts for the year ended Dec. 31 last be received and adopted.

Mr. A. M. PADDON, M.Inst.C.E. (Deputy-Chairman): I beg leave to second that motion.

The CHAIRMAN: I should be pleased to hear any remarks the stockholders may wish to make, and answer any questions they may raise.

Mr. G. E. S. DAVIS: I should like to say, first, that my father, the late Mr. Acton Davis, was very much interested in this Company and was a shareholder for very many years; and also that when your shares were converted into stock I had to hand over a share certificate belonging to my great uncle, the late Mr. George Acton, which certificate was dated 1859. So that the members of my family are no mushroom stockholders.

There is an item in the balance-sheet to which I should like to draw attention. It shows that the bank loans (secured) in sterling and francs amount to a large figure. Surely they are rather permanent than temporary. If that is so, would it not be desirable for the Board to take advantage of the high prices of the securities in their possession and sell them and pay off the loans, so that we get rid of that item on the balance-sheet? We should be saving the interest on the bank loans, and I imagine that the securities we should sell yield in interest rather less than the amount of the interest on the bank loans. That is only a suggestion I make to the Board.

Mr. B. L. BISGOOD: Perhaps I may anticipate the wishes of most people here in associating the stockholders with the remarks made concerning Dr. Carpenter, and congratulating our Chairman and our new Director upon their appointments. With regard to the dividend, of course, we are delighted that an increase is proposed; but many of us think that the value of the total assets of this Company must surely be somewhere in the neighbourhood of £200 per £100 of stock, and while we think that 6% dividend is fairly adequate, if we realize the real value of the assets of this undertaking we have reason to hope that in due course we shall eventually get back to the pre-war figure.

A matter which is present in the minds of many of us is the enormous taxation which a Company of this type has to bear. It has to bear a tax of 5s. in the £ in this country, and I imagine that the taxation in France is not very much less, so that possibly the total is 10s. in the £—although I do not know the exact figure. There must be a point at which a Company registered in England and trading abroad is going to be up against an enormous burden of taxation, and if that is so it might be right for the Board to review the whole position, because the earnings must be at least 25% more in French money than in English money, and, therefore, it would follow that in the hands of a French Company the shares would have a much higher value, having regard to the higher dividend that would be paid. Whether or not the present time is opportune, or whether the occasion will arise in future, I do not know, but I think the Board should bear in mind the possibility of either registering this Company in France or selling to a French concern. I do not suggest that, however, without suggesting also that if such a course were adopted we should compensate liberally any persons who suffered loss of office. Obviously, that would have to be done, because a Company which has been trading for 100 years or thereabouts must have in its employ many people who deserve consideration.

I should like to congratulate the Board on the work which has been done by this Company. Since the war we have been engaged in reconstructing the whole undertaking, and I think that has been done most successfully. I am quite certain that the stockholders will have every confidence in the Board so long as the Company is conducted as an English Company.

Mr. E. L. BURTON: There are two matters which call for emphatic approval and comment. In the first place, the accounts in their present form do give the stockholders a real view of the Company's condition and position. Secondly, another Accountant has been elected as Auditor, so that to-day we have two gentlemen who are, I am sure I can say without question, competent, and certainly fully qualified, Auditors to do an auditing job.

The CHAIRMAN: In reply to Mr. Davis I would say that the question of selling securities and paying off the bank loans has been discussed seriously by the Board lately; it was discussed at the last Board meeting, and will be discussed again this afternoon. The reason for the loans is the new gas-works at Roche Maurice, which have been paid for out of current revenue, with the help of the banks.

I am obliged to Mr. Bisgood for his remarks. You will not ask me, I am sure, to mention the value of £100 of the Company's stock, but I am not in the least ashamed of saying that I agree with Mr. Bisgood in that matter. In saying that, however, I am not committing my colleagues on the Board to my views. Taxation in this country and in France is very heavy. The question of domiciling the Company in France has been discussed for a good many years, but the difficulties are very great. I am grateful to Mr. Bisgood for saying that possibly we might have to go to France and that possibly we might change hands. The Board's attention would not have to be confined only to the value of each £100 of stock, however. I am glad it has been placed on record that you would only approve an arrangement which made provision for the loyal staff who have built up this Company. Even if we had a most wonderful offer from the point of view of the stockholders I would take no part unless I saw that the towns we supply, and the staff both in France and in this country, would be taken care of. Anything else would be wrong and unfair. Of course, the 6% dividend, being free of tax, is really equivalent to 8%, and, whether we sell or whether we become a French Company, or whatever else happens, it would be my earnest wish, and the wish of the Board, that we should get back to the pre-war dividends. I hope, if the world does not go quite upside-down, that that day will arrive; but do not ask me to say when.

I am grateful to Mr. Burton for what he has said, and I think we may take it that the affairs of the Company are, from the auditing point of view, in very safe hands.

The resolution for the adoption of the Report and Accounts was then put to the meeting and carried.

DIVIDENDS.

The CHAIRMAN: I now move:

> That the interim dividend of 2½% paid on Oct. 1 last is hereby confirmed; that a final dividend for the year ended Dec. 31 last at the rate of 3½% be now declared, such final dividend to be paid on April 1 next, the whole out of interest and profits, and free of income-tax.

Mr. W. G. BRADSHAW, C.B.E.: I have great pleasure in seconding that motion.

The resolution was carried.

RE-ELECTION OF DIRECTORS.

The CHAIRMAN: I propose:

> That Mr. W. G. Bradshaw, C.B.E., and Mr. C. F. Crookenden, F.C.A., be re-elected Directors of the Company.

You all know Mr. Bradshaw and Mr. Crookenden and their positions in the world. I am sure you have had, and retain, confidence in them, and I have the greatest confidence in asking you to re-elect them.

Mr. A. M. PADDON (Deputy-Chairman): I beg leave to second the resolution.

The resolution was carried, and both Mr. Bradshaw and Mr. Crookenden responded.

The CHAIRMAN: I will ask the meeting to confirm the action taken by the Board last September. The resolution is:

> That the election of Mr. S. H. Le Roy-Lewis as a Director of the Company be hereby confirmed.

Mr. A. M. PADDON (Deputy-Chairman): I have pleasure in seconding.

The resolution was carried, and Mr. Le Roy-Lewis briefly expressed his thanks.

RE-ELECTION OF AUDITORS.

Mr. E. L. BURTON: It gives me very great pleasure to propose:

> That Mr. B. Bennett Holroyd, F.C.A., and Mr. D. M. Touche, F.C.A., be re-elected Auditors of the Company at the same remuneration as last year.

Mr. D. H. MCLAUCHLAN seconded.

The resolution was carried, and Mr. Holroyd responded.

VOTES OF THANKS.

The CHAIRMAN: It is my pleasing duty to propose a vote of thanks to the staff. If we could have arranged this meeting next week we should have had with us our representatives in the towns we supply in France, for then they will be in London for a conference. The Directors may work as hard as they like and decide on policy, but unless they are backed very earnestly and very sincerely by the staff, from top to bottom, they cannot do very much. Mr. Williams is the senior officer of the Company, and I think he will agree that in France the Company has some of the most devoted servants. There has been rather an awakening in the Company in getting to work on the principles on which gas is sold, and in the application of a little more push and drive. Our efforts are beginning to bear fruit, and I think that in another year or two our selling organization will be one of which we shall be very proud. Our senior officer in France is M. Huon (the Manager at Nantes), who retires at the end of next year. I ask you to accord to the whole staff both in England and in France, the thanks of this meeting, and I will ask Mr. Williams to convey those thanks to every member of the staff.

Mr. S. H. LE ROY-LEWIS: In seconding this proposal, I can do little more than echo the words of our Chairman with regard to our staff both at home and abroad. It is but a short time since I joined the Company, but I have been most impressed in every way by the extraordinary efficiency of the staff I have met so far. I have a certain experience of these dual-nationality companies and the difficulties which the staffs are continually contending with—difficulties in respect of mental outlook, habits, and so on—which are very great indeed, and they require great elasticity of mind and a great knowledge of their subject in order to be able to deal really adequately with those difficulties. I can assure you that our staff in London is very efficient, and I hope to go abroad shortly and to make the acquaintance of as many of our staff there as I can, so that next year perhaps I may be able to give you my impressions of them.

The resolution was carried.

Mr. F. ELIOT WILLIAMS, O.B.E. (General Manager and Secretary), responding, said: May I be allowed to thank you on behalf of the staff in London and in France for the vote of thanks you have accorded us. I have said before that that vote of thanks is appreciated by those who are working abroad, not under the eyes of the stockholders, and it is a pleasure to me always to convey it to them. As the Chairman has said, the Managers will be in London next week. We have a system of periodical conferences with the Managers, and usually each

conference is held at one of the French works, but this year our Managers are coming to London so that we can show them certain interesting things in connection with the gas business here. I shall convey your vote of thanks to them personally.

This year we shall lose the services of two very old colleagues—Mr. Heather, the Chief Accountant in London, who retires after 48 years' service, and M. Coudelou, our Manager at Le Havre, after 39 years' service. There have been certain changes in the management of the stations in France, and I have had occasion, on behalf of the Board, to notify the Mayors of the towns concerned of the changes and the new nominations. The stockholders may be interested in extracts from letters I have received from the respective Mayors, because these extracts serve to indicate the type of men we have to represent us abroad. The Mayor of one town states: "The municipal administration can only regard with regret the departure of your present Manager, with whom they have for so many years maintained the most cordial relations, and whose valuable collaboration they have at all times appreciated. They do not doubt that his successor will maintain the tradition which is so essential to the good working of the public service for which your Company is responsible. They will extend a cordial welcome to his successor." Another letter, written only last week, stated: "You may be assured that the municipality, who record with pleasure the excellent relations which have always existed between the town and the European Gas Company, will give a hearty welcome to your new Manager, and will facilitate his task to the utmost, as they have done for his predecessors, and especially for the Manager who is now retiring. He will carry with him in his retirement the regrets and the cordial recollections of all the members of the municipality."

I think those letters indicate that our representatives have succeeded in creating an atmosphere of friendly good-will with the people with whom we are working.

Mr. B. L. BISGOOD: I should like to propose a vote of thanks to our Chairman and his co-Directors. I need hardly say that it is a matter of immense gratification to us to know that the business of this Company is in the hands of a Chairman who has such enormous experience of this type of business.

Mr. G. E. S. DAVIS: I should like to second.

The vote of thanks was carried.

The CHAIRMAN: Thank you very much, on behalf of my colleagues and myself, for your vote. The task of a Director of a foreign gas company in London is not ordinarily so easy as that of a Director of an English gas company in London, and we have frequently to deal with very difficult matters. We are only human, and when these difficulties arise we do our best to meet them. But we should never do anything without your permission and your sanction, and I hope the Company would never do anything without the permission and sanction of the municipalities of the large towns in respect of which we hold concessions and have obligations. The towns in which we supply, the people who work for us, and the stockholders, must all be considered and treated equitably.

Reports from Overseas

Metropolitan Gas Company of Melbourne.

At the 110th Half-Yearly Meeting of this Company, Sir JOHN GRICE, in the chair, said: During the half-year under review the expenditure on coal and oil used in production of gas was £202,664—a decrease of £10,320 on the corresponding half of 1931. A total of 114,434 tons of coal (3534 tons less than during the corresponding 1931 period) were carbonized; 476,814 gallons of oil (a decrease of 28,105 gallons) and 9047 tons of coke were used. From the sales of gas, £603,224 were received in the half-year in comparison with £625,803 for the December half of 1931.

The quantity of gas sold for the half-year—1,924,048,000 c.ft.—was greater by 16,223,000 c.ft. than the sales for the corresponding period of 1931. This increase, in such times as the present, amounting to 0·85%, is gratifying. In the year 1932 the sales totalled 3,773,463,000 c.ft., as compared with 3,802,786,000 c.ft. for the year 1931. This is a reduction of only 29,323,000 c.ft., equal to 0·77%, though the 1931 figures, in comparison with 1930, showed a decrease of 5·7%.

The net profit for the half-year is £108,379. From that amount £20,000 has been transferred to reserve fund, and the payment of a dividend at the rate of 6s. 6d. per share, equal to a return of 7·97% per annum on the capital contributed by shareholders, is recommended, leaving £3879 to be added to the carry forward. A provision of £20,000 has been made in the revenue account for a portion of the cost of alterations to the head office building which are to be at once undertaken. An amount of £12,685 has been debited to rents, rates, and taxes, being the balance of the sinking fund established in 1904 to write off the cost of the present offices, and the total amount originally expended on the building—*i.e.*, £41,871, has now been written out of the capital account.

During the half-year ended Dec. 31, 1932, 3·64 miles of new mains were laid, compared with slightly less than 1½ miles for the corresponding period of 1931. Mains renewals totalled 1·36 miles, as against 3 miles for the December half of the previous year. The number of new services laid during the half-year was 925, necessitating the use of over 11½ miles of tubing. This figure shows an increase of 57% over the comparable period of 1931.

Wellington (New Zealand) Gas Company, Ltd.

The Annual Meeting of shareholders of the Wellington (New Zealand) Gas Company, Ltd., was presided over by Sir HAROLD BEAUCHAMP (Chairman of Directors).

In moving the adoption of the report and balance-sheet, the CHAIRMAN congratulated the shareholders upon the results achieved, more especially in view of the adverse economic conditions with which all classes of the community had been faced for two years or more. The profits earned warranted the Board in recommending a dividend of 4% for the last half of the Company's year, which, with the interim dividend of 4% paid in August, would give a return of 8% for the full year, and permit of carrying forward £14,394.

You will note, he said, that substantial funds have been transferred to certain reserves, all of which make for financial strength. Our revenue for 1932 is smaller than that for 1931, but that is accounted for chiefly by the reduction of 3d. per 1000 c.ft. in the price of gas, which took effect as from August, 1931. That concession in price affected our consumers to the extent of not less than £7800. The gas consumption shows a decrease of almost 4%.

The falling off in income from rents and the lower return due to the imposition of a 10% tax on interests from inscribed stock, have also affected us adversely; altogether the reduction in income totals £17,485; the expenditure, however, was correspondingly reduced, so that the profit is only £4295 less. We pay income-tax at the rate of 4s. 6d. in the £ *plus* 30%, or 5s. 10·2d. in the £. The amount provided this year for rates and taxes, including income-tax, was £27,952, which is £1420 greater than the dividends paid to the shareholders. Taxes in 1932 amounted to 13·4% of the total revenue from gas sales, being equal to 10·7d. per 1000 c.ft. of the gas sold.

Under the management of Mr. Frank Kennedy, to whom considerable credit is due, the activities of the distribution and sales departments have been productive of good results. The sales of appliances summarized are as follows: Cooking, 1694; water heaters, 523; heating, 134; total number, 2351. The number of new consumers added was 714, and 4 miles of mains were laid, making the total length 262 miles.

Maryborough Gas and Coke Company, Ltd. (Queensland).

Gas sales show a considerable falling off as compared with the December period of 1931, due to the existing economic conditions. Residual products, however, show an increase, owing to more tar being sold. Some of the existing mains were renewed during the past term, which accounts for an increase in the expenditure as compared with 1931.

After writing off £500 for depreciation, and making provision for all other charges, the profits amount to £1230. To this amount has to be added £117 brought forward from last half-year, making the total amount at credit of profit and loss account £1347. The Directors recommend payment of a dividend of 6% per annum, amounting to £1237, leaving a balance to be carried forward of £110.

Auckland Gas Company.

The 71st Annual Meeting of the Auckland (New Zealand) Gas Company was held on Feb. 6, 1933—Sir GEO. ELLIOT in the chair.

In moving the adoption of the report and statement of accounts, the CHAIRMAN said: The total receipts from the sale of gas and residuals, together with the balances of the various accounts, amount to £405,388. This sum is £23,644 less than that of last year, and represents a shrinkage of 5·51%. This reduction is brought about by reduced prices for gas and coke, made contemporaneously with the 10% cut in wages, as well as by a lessened output. Actually, the revenue from gas has declined by £18,118, or 4·93%, an amount which is not surprising in view of the reduction in prices referred to and the present adverse financial and economic conditions. On the other side of the working account, expenses, excluding taxes and rates, have been reduced by £21,329, so that, apart from taxes and rates, the reduction of expenses has kept reasonably in step with a falling income.

In 1930 income-tax paid by this Company was £16,149. In 1931 it had risen to £25,001, and in 1932 to £30,433. Thus, in the short space of two years, while profits have been practically the same, income-tax has increased by £14,284, and at present the Government is receiving an annual sum from this Company equalling 49% of the dividends paid to shareholders.

During the year, gas service pipes have been connected up with the premises of 356 additional consumers, bringing the total number up to 48,685. Two and three-quarter miles of new mains have been laid, making the total mileage 673½, and 1225 cookers have been installed, making a total number of 43,526 in use.

British Gas Light Company, Ltd.

The Two Hundred and Second Ordinary General Meeting of the British Gas Light Company, Ltd., was held on Wednesday, March 22, at the Chief Office of the Company, 2, The Abbey Garden, Westminster, S.W. 1—Mr. HENRY WOODALL, M.Inst.C.E., Chairman and Managing Director, presiding.

The SECRETARY (Mr. A. J. Mumford) read the notice convening the meeting, together with the report of the Auditors. The Directors' Report and the Statement of Accounts for the year ended Dec. 31, 1932, were taken as read.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN said: The accounts and report before you show a satisfactory year's working.

The year under review, 1932, has been a difficult one as the weather has been much against us. Had we experienced ordinary weather conditions I am sure we should have shewn an increase in gas output, as we have very largely increased our sales of gas apparatus and also added 3000 to the number of our consumers. In common with nearly all gas undertakings our output has decreased—but only to the extent of 2·79%.

Nothing spectacular has happened since we last met, and I have only to report a year of steady sound work.

One thing your Directors, and I am sure you too, are grateful for is that we have been able, in spite of almost unparalleled trade depression and unemployment, to keep all our men fully employed.

Summarizing the accounts, we have made enough profit to be able to pay our usual dividend of 7½%, add to reserves £12,861, to our Pension Fund £10,168, and then slightly increase the "carry-forward" to £87,859. It will be observed that to enable us to take the full statutory profit from Hull we have had to draw on the Hull Station Reserve Fund, whereas results at Norwich have been such as to permit of a larger sum being added to that Station's Reserve, so that after addition of interest on the respective investments, the net result is, as stated in the report, an increase of £2861 in the amount of the funds. These Station Reserve Funds are formed under the provisions of the Gas Acts; they are added to when the Station profits exceed the sum which the Parent Company is entitled to take, and are drawn upon when the profits earned fall short of the statutory amount. They thus serve the very useful purpose of keeping steady the profits available for distribution. The General Reserve Fund, on the other hand, has been built up out of the profits actually available for division among the members, and it is satisfactory to see it now standing at the useful figure of £150,000.

CAPITAL ISSUE.

The imminent issue of additional capital was mentioned at the last meeting. This took the form of 5½% redeemable cumulative preference shares, the creation of which was authorized at the Extraordinary General Meeting held on April 20. We required £350,000 to pay off our loan from the bank and provide cash to meet the Company's immediate requirements, and were able to obtain an offer to take up at par sufficient of the shares to provide this sum. The shares were subsequently converted to stock. It will be remembered that the new preference capital ranks after the £100,000 7% preference stock.

From the statement included with the report and accounts it will be seen that the Company now controls 30 gas undertakings, 1 electricity undertaking, a water undertaking, and a chemical works, and the map attached to the report, which we hope you will find interesting, gives a good idea of how widespread are the Company's interests. It will be noted that in a number of cases we have been able to form little groups—as in North Wales, Wiltshire, Essex, Suffolk, and, to a greater extent, in Norfolk. Among other advantages, this grouping of undertakings makes for economy in local management.

It will be seen that the Dividends and Interest from Subsidiaries show an increase for the year 1932 of about £2000 over the previous year, and the yield on our investment is increased by ½% to 7%. This is very satisfactory as it shows we are reaping the advantage of the work and attention that has been given to the re-organization and improvement of these undertakings and the money we have expended in putting down new plant. It is the Directors' aim that all of the Works down to the smallest shall be fully equipped with up-to-date plant and appliances suitable to the special local requirements—in 1932, for instance, at Westgate the old horizontal retorts were replaced by an installation of intermittent vertical chamber ovens. The results from this new plant have exceeded our expectations. The make per ton is much higher than in the old plant and labour charges are considerably reduced. We are now able at Westgate to use entirely Kent coal and obtain good results in gas and a greatly improved coke. Incidentally the installation was the first erected in England of this particular type of chamber ovens—the Jenkins-Klönne.

LONG SERVICE RECORDS.

Reference has been made on previous occasions to the long service of the Company's employees. Up to date 548 Long Service Medals have been presented, these are granted after 25 years' service. There is also a rather more select band who have completed 50 years' service, amongst whom may be mentioned the late Mr. Frederick Wilkin and his father, Mr. John Wilkin, who both completed 50 years as Directors, and Mr. A. W. Brookes, whom we still have with us; this year one of our Auditors, Mr. E. Knowles Corrie, qualifies for the distinction, having been first appointed an auditor at the General Meeting on Sept. 26, 1883.

Altogether we have 148 pensioners. Of these 87 are enjoying benefits under the Workmen's Pensions Scheme, and the remainder comprise workmen and others retired before the scheme was put into force.

COMPETITION.

Competition is getting more and more severe but we are not afraid of electric competition though we do sometimes complain of its unfairness. Many of the towns, and the most important, we supply are provided with electricity by the local authority and as one of the largest ratepayers we do feel that we are not given the consideration we deserve after giving good service in the case of our larger works for over 100 years. Those who look after the legislation in connection with our Industry are very alive to the injustices under which we suffer and are always ready to assist us in our difficulties when called upon. The organization of the Industry is steadily improving, never was so much research work being done, new uses are daily being found for gas, and we have every reason to be satisfied with the future prospects. Our works are all in excellent order, we never had better or keener officials, and when the improvement in trade, which we devoutly hope will not be long delayed, arrives, we are in a position to carry out our part—and a not unimportant part—in the provision of light, heat, and power in a most convenient form in connection with the domestic and industrial economy of the country.

The CHAIRMAN then moved the adoption of the report and accounts.

The DEPUTY-CHAIRMAN (Mr. Harold G. Palmer) formally seconded, and no questions being raised, the resolution was put to the meeting and carried unanimously.

DIVIDENDS.

Resolutions were then passed approving the payment by the Directors of Dividends at the rate of 7% per annum on the Cumulative Preference Stock, 5½% per annum on the "B" Redeemable Cumulative Preference Stock, and an Interim Dividend of 3½% on the Ordinary Stock, all less Income-Tax, and declaring a Final Dividend payable on April 1, of 4% on the Ordinary Stock, making 7½% for the year less Income-Tax.

RE-ELECTION OF DIRECTORS.

The CHAIRMAN thereafter proposed the re-election of Mr. Harold G. Palmer to the Board. Mr. Palmer, he said, was always most helpful on all occasions, and his very wide experience of the management of gas undertakings was of the greatest value.

Mr. GRAHAM WILKIN seconded this proposition, which was carried.

The CHAIRMAN then moved the re-election of Mr. Wilkin, whose name alone would guarantee his re-election to the Board of the Company. His family had served the Company very well for a great number of years, and Mr. Wilkin was just as anxious for the success of the undertaking as his forebears were.

Mr. A. W. BROOKES, in seconding, said that the name of Wilkin was familiar to all the shareholders of the Company, and he was delighted that he had a seat on the Board. The amount of work he did for the Company was enormous.

This resolution was also carried unanimously, the two gentlemen briefly acknowledging.

RE-ELECTION OF AUDITORS.

The election of Auditors next followed and Mr. E. Knowles Corrie and Mr. Wm. Cash, Junr., were duly appointed.

VOTES OF THANKS.

Mr. F. R. W. SLY, in proposing a hearty vote of thanks to the Chairman and Directors of the Company for their conduct of the Company's affairs during the past year, said that the exposition of the Company's progress was very fine, and there was a very happy outlook so far as their dividends and the future were concerned. As the Chairman had said, had it not been for the unusual conditions atmospherically during the year, the consumption of gas would not have decreased, and with the additional 3000 consumers, it must be that the Company would not only profit by that, but would maintain its very substantial dividends.

Capt. W. J. LIBERTY, in seconding the vote, complimented the Directors on the form in which they had distributed their report and accounts, and said that this would enable each of the shareholders to take a further interest in the Company of which they had the honour to be members.

The resolution was carried unanimously, and in reply

The CHAIRMAN thanked them very much on behalf of himself and his colleagues for the vote. This was a very nice Company to serve, and they enjoyed their work for it; but it did entail a good deal of work. There was a large amount of ground to traverse, and they had to visit their Stations very frquently and keep in as close touch as possible with their various managements.

Proposing a vote of thanks to the Secretary, officers, staff, and workpeople of the Company, the CHAIRMAN went on to say that he did not think they could have had a report such as they had unless they had an excellent staff. Knowing them all intimately—having worked with them for some years—he could say that they could not have had a better staff, and the feeling among the staff and workpeople was of the very best. He had

often heard it said by the staff that the British Gas Light Company was a very fine Company to work for. They did all they could for the comfort of their people, and there was a loyalty among the men which was encouraging.

Mr. HAROLD G. PALMER, seconding, said he had great pleasure in associating himself with the remarks of the Chairman.

The vote of thanks was carried unanimously, and in reply

The SECRETARY (Mr. A. J. Mumford) thanked them very much on behalf of the officers and workpeople for the kind terms in which the resolution had been passed. All were doing their utmost to maintain the very high standard of efficiency which was set by the Board of Directors, and they would be happy and encouraged to know that their efforts had been so pleasingly recognized at this meeting.

Gas Companies' Results in 1932

Blyth.

The revenue of the Blyth Gas Company amounts to £43,177 and the expenditure to £32,585, leaving a profit on the year's working of £10,592. The Directors recommended that a dividend of 4%, less income-tax, on the ordinary stock be paid, making the interim dividend paid in August last £8% for the year 1932, and that the balance of £8991 be carried forward to the next account.

Burnham.

A sum of £800 was given to consumers by the Burnham Gas Company, Ltd., in 1932. The lowest pre-war price of gas was 3s. 4d. per 1000 c.ft. To-day it is only 3s. 4½d. At the annual meeting the Chairman gave credit for the strong position of the Company to the Moore gas plant, which has effected great savings. The newest Moore plant put to work last summer is giving great satisfaction. The Company has applied to the Board of Trade for leave to extend their area of supply to Brean, Lympsham, East Brent, and the parts of Brent Knoll and Berrow not included in the present limits.

Cardiff.

The Annual Meeting of the Cardiff Gas Light and Coke Company was held at the Gas Offices, Bute Terrace, Cardiff, the Chairman of Directors (Mr. Lawrence G. Williams) presiding. In presenting the report and accounts, the Chairman said: While tar has been a bad and difficult market, and has provided less revenue than we had every reason to expect that it would, an improvement in coke has provided compensation. The sum realized is £52,662, against £52,978 in 1931. The sales of gas, on the other hand, have not reached expectations, and a slight reduction will be noticed herein. Great efforts have been made to counteract the decline in certain directions due to trade depression, by finding ever-increasingly new outlets for gas as an industrial fuel. Cardiff provides a centre for the South Wales area, and an industrial showroom and laboratory have been provided at these works in Bute Terrace. A trained staff is in attendance to give information and advice upon any industrial problem in the use of fuel. It is pleasing to record that the demand for up-to-date apparatus is an ever-increasing one. The record of sales during the year can only be considered as satisfactory in the highest measure. Two thousand eight hundred and forty-two new cookers have been issued, and also 4687 other appliances, such as boilers and heaters, making a total of 7529. The number of consumers shows a further substantial increase of 916, making a total of 60,780. Our recommendations include the placing of £1000 to reserve fund. This has a bearing upon the co-partners' bonus, which is thus increased by £500—namely, from £6768 to £7268. Mr. Robert H. Williams (Deputy-Chairman) seconded the motion, which, on being put to the meeting, was carried unanimously, after which dividends at 6% per annum on the ordinary stock and 4½% per annum on the preference stock were declared.

Derby.

The 113th Annual General Meeting of the Derby Gas Light and Coke Company was held in the Stockholders' Room at the Company's offices, Friar Gate, Derby. Sir John Ferguson Bell, Chairman of Directors, presiding, said: During the last two years our capital commitments have amounted to £165,745; the greater part—£95,552—has been expended to enable the Company to obtain a bulk supply of coke oven gas equal to rather more than one half of our total output. On mains, meters, stoves, &c., during 1932 we have expended £35,179, less £13,223 written off for depreciation, leaving a net capital outlay on these of £21,956. The progressive nature of our business is manifest. During the past year we have added 1348 new consumers, and they now number 50,414. The expenditure on capital account at the end of the year was £905,184, of which £60,000 has been transferred from net revenue to capital account in respect of expenditure for coke oven gas. This £60,000 is not a part of the capital of the Company entitled to dividend, leaving the net capital of £845,184, less £77,072 premiums, being an increase of £40,522 on last year, which is very moderate for a progressive public utility company supplying an area of over 140 square miles. The expenditure charged to capital account is in excess of that raised by £170,842, mainly in consequence of our having spent during the last two years £95,552 in new works to enable us to obtain bulk supplies of purified coke oven gas. We have laid down in all 9 miles of 15 in. and 6½ miles of 12 in. high-pressure gas mains, erected purification plants at both Blackwell and Clay Cross coke ovens, and at our Belper Works a 2-million c.ft. capacity gasholder with steel tank and compressing plant to transmit the gas from Belper to Derby. The gas supplied during the last 12 months from these coke ovens was 36·6%. The average calorific value was 516·9 B.Th.U., being 16·9 B.Th.U. in excess of our declared standard. The cost of manufacture is £151,214, being a decrease of £32,493 on last year. During the year we purchased from the Blackwall and the Clay Cross coke ovens just under 706 million c.ft. The total expenditure is £266,160, a decrease of £25,655, leaving a balance of £48,917 to be transferred to profit and loss account or £5067 more than last year. On the credit side of the revenue account the income from sale of gas amounts to £230,062, being a decrease of £1873, due to a reduction of one penny per therm or 5d. per 1000 c.ft. on gas used for industrial purposes from July 1 last. Residual products less cost of manufacture produced £48,115, compared with £65,871 last year, a drop of £17,756. This decrease is entirely accounted for by nearly 30% less coal carbonized; actually we have done rather better with residuals, as the net proceeds upon cost of coals is 61·14% as compared with 54·57% last year. The total revenue amounts to £315,077, which is £20,588 less, but as our expenditure is £25,655 less the profits are as already stated £5067 more than the previous year.

The final dividend recommended is 5%, less tax. An interim dividend of 3½% was paid for the June half-year, making 8½% less tax for the year.

Douglas.

The Douglas Gas Light Company have made a net profit of £11,366 on the last year's working. The Directors have entered into a contract for the erection of a small crude benzole plant. It was stated at the Annual Meeting that the adoption of gas fuel for motor vehicles would depend largely upon the cost of the initial outlay for the provision of cylinders and compressors, but the running costs were very much cheaper than petrol.

Exeter.

Presiding at the Annual Meeting of the Exeter Gaslight and Coke Company, Mr. John E. Daw, Chairman of Directors, recalled that last year he suggested that the sale of gas might be adversely affected by the general decreased earning of industry and the economy which must necessarily be brought about by it. The experience of the past year had confirmed that view, but he was glad to say the decrease in the Company's sale was only 1·7%, and in that they were more fortunate than many undertakings which had suffered heavier decreases in demand. Sales in recent years had shown a large increase, for whereas in 1922 sales of gas were 525 million c.ft., in 1932 the sale was 751 million c.ft., showing an increase of no less than 226 million c.ft., or over 43% increase in ten years. The cold weather in January increased the demand substantially, so popular had the gas fire become, and the output for the month showed an increase of over 12½%. The Directors, he concluded, recommended that for the six months ended Dec. 31, 1932, there be paid 10½% per annum on the £40,000 original stock, and 7½% per annum on the £130,500 new ordinary shares, less income-tax. Dividends at the following rates per annum were declared for the six months ended December, 1932: 4% on the preference stock, 5% on the preference shares, 7½% on the new ordinary shares, and 10½% on the original stock, less income-tax.

Gosport.

Presiding at the Annual Meeting of the Gosport District Gas Company, the Chairman, Mr. W. E. Churcher, stated that notwithstanding the trade depression of the past year, there had been a considerable increase in the quantity of gas sold by the Company, amounting to 18,057,200 c.ft. over the previous year. This was not entirely attributable to the extension of the Company's area of supply to include Bishops Waltham, as the figures showed the increase in the new district to be 3,672,000 c.ft., and the increase in the older area to be no less than 14,385,000 c.ft. At the annual meeting in 1931 he drew attention to the fact that the annual production of gas by the Company amounted to just over 400 million c.ft., and for 1932 this had increased to 449,840,000 c.ft., so that in the short space of two years there had been an increase of nearly 50 million c.ft. They had now had a complete twelve months' working since the acquisition of the Bishops Waltham undertaking, and he could say that the anticipations as to the success of this development were being fully realized. Not only had the quantity of gas made been the highest in their experience, but "peak" figures had also been established in respect of the balance on revenue account of £15,228—which would have been even higher but for the first contribution made to the renewals fund—and in regard to the revenue account itself, the total of which, £93,589, was now approaching six figures. The number of appliances on the district had increased considerably, and 705 additional consumers had been connected during the year, bringing the total

to over 12,600. New capital consisting of £2000 5% preference stock and £13,000 5% debenture stock was issued during the year and realized average prices of £105 10s. and £109 13s. respectively. Payment was approved of the maximum dividends of 5% on the preference stock and £7 16s.% on the consolidated ordinary stock.

Hastings.

Mr. A. M. Apel, Chairman of the Directors, presided over the annual meeting of the Hastings and St. Leonards Gas Company. The report of the Directors stated that the accounts for the year ended Dec. 31, 1932, showed a total expenditure of £126,903, and a total income of £155,067. This left a balance of £28,163, to which had to be added £421 received for interest. The sum of £27,838 was required to meet the interim dividends which were paid last September, the dividends now recommended, interest on debenture stock and consumers' deposits, and income-tax. Last March the stockholders authorized an application to the Board of Trade for a special order under Section 10 of the Gas Regulation Act, for an extension of the Company's area. This application was deposited in July last and was still under consideration by the Board of Trade. During the year the Company's mains had been extended to Whatlington, Westfield, Sedlescombe, and Guestling Thorn. Having regard to the climatic conditions and the prevailing depression, it was satisfactory to record a slight increase in the sale of gas, together with an increase in the number of consumers and of gas-using appliances sold. The centenary celebrations of the Company were carried out with gratifying success from every point of view. Interim dividends (less income-tax) were paid in September as follows: £7% per annum on the 5% converted stock; £5 10s.% per annum on the 3½% converted stock; £6 8s.% per annum on the 5% additional stock. The Directors recommended that the final dividends for the year be paid at the same rates. The Chairman said that the amount received by the sale of gas is £116,933, showing an increase of £234 over 1931. When they consider that in 1931 they broke all records in the sale of gas, and that last year was one of general depression, with more than the average of mild climatic conditions unfavourable to the sale of gas, it was a matter of congratulation that they had not only equalled the record output of 1931. but had exceeded it. The rental received from meters and stoves at £14,893 showed an increase of £240, due entirely to an increased number of consumers.

Ilfracombe.

The Annual General Meeting of the Ilfracombe Gas Company was held on Feb. 14—Mr. R. M. Rowe, C.C. (Chairman of Directors), presiding. The report on the year's work, presented to the proprietors, showed that there was an available balance of £3525, after paying an interim half-yearly dividend of £2 10s.% on the preference stock, and £3 5s.% on the consolidated ordinary stock. The Directors recommended a further payment of £2 10s.% on the preference stock, and £3 5s.% on the consolidated ordinary stock. The Directors not only reported an increase in the sale of gas, but that as and from the Christmas (1932) reading of the meters, the price was reduced by ½d. per therm, or 2¾d. per 1000 c.ft., with further reductions to large consumers, and for gas used in gas engines. The Company have applied for a Special Order under the Gas Undertakings Acts, 1920 and 1929, for increasing the borrowing powers of, and conferring further useful and expedient powers upon, the Company.

Minehead.

The balance of net profit of the Minehead Gas-Light and Coke Company for the year is £6147, which, added to the amount brought forward from the last account, £1120, makes a total of £7268. After deducting income-tax, £1634, and mortgage interest, £444, carrying £500 to reserve account, £250 to leasehold depreciation fund account, and £250 to renewals fund account, there remains a balance available for distribution of £4189. The Directors recommended the declaration of a dividend of 8%, less income-tax, on both the £5 and £1 shares, which absorbs £2820, leaving a balance to carry forward of £1369. The Directors deeply regret to report the decease of a valued Director and colleague, Mr. W. G. Phillips, who served as a Director since 1924 until August, 1932. Mr. F. Stevens was appointed a Director of the Company to fill the vacant post. The sale of gas was 59,852,300 c.ft., an increase of 1,616,300 c.ft., or 2·8% over 1931. The net gain in consumers for 1932 was 57, while the gain in apparatus was 62 cookers, 35 water heaters, and 89 gas fires and radiators, with over 150 lighting points. The old 2-in. mains in Marshfield Road and Victoria Road have been taken out and replaced with 4-in. steel mains. During the year the old 8-in. works connections have been increased to 12 in. and 14 in. A larger rotary washer has been erected, and larger exhausters are ready for fixing.

Northwich.

The Annual Meeting of the Northwich Gas Company was held on Feb. 27, 1933—Mr. C. T. Eachus (Chairman) presiding. In moving the adoption of the report and balance-sheet, the Chairman said the year's working had turned out very satisfactorily considering the depression of trade through which they had passed. Gas sales showed an increase of 3 million c.ft. Mains had been extended in the district, and additional apparatus had been fixed during the year—namely, 141 cookers, 38 fires, 73 boilers, 8 geysers, and water heaters, which was evidence that the Company was progressing. Residual products showed an increase, principally due to better prices in tar, and the prospects in this department are encouraging. The revenue account showed a profit of £6761, and after payment of interim dividends, interest on loans and reserve fund, there was, with the addition of the balance brought forward, a disposable balance of £5937. Dividends were declared at the rate of 4% per annum on the preference shares (free of income-tax), 5% per annum on the preference stock (less income-tax), and 7% per annum on the ordinary stock (less income-tax) for the past half-year, which will absorb £2372, making, with interim dividends, 4%, 5%, and 6% for the whole year respectively, and £250 was transferred to waterless holder suspense account, and £250 to contingency fund, leaving a balance of £3064 to be carried forward.

Wakefield.

The continued depression in trade has had the effect of reducing the sales of gas by the Wakefield Gaslight Company, but the Directors feel satisfied that as and when conditions improve the Gas Industry will share the benefits. The total gas sold for the year is 313 million c.ft. The inner and outer lifts of No. 1 holder have been replaced by one single lift prepared to receive an outer lift when necessary. The framework has been completely overhauled and renewed where necessary. The present capacity of the holder is 200,000 c.ft., and it is now used as a water-gas holder. The cost was £4299, of which £2299 has been charged to revenue and the balance of £2000 added to suspense account. An interim dividend of £2 10s.% on the ordinary stock and £2 10s.% on the maximum stock, and the half-year's dividend of £2 5s.% on the preference stock, were paid on Sept. 1, and the balance now available for dividend is £7658. The Directors recommended that after paying the prescribed dividend on the 4½% preference stock, further dividends be paid as follows: £4% on the £130,000 of ordinary stock (making £6 10s.% for the year), £2 10s.% on the £81,650 of 5% maximum stock (making 5% for the year); and that the balance be carried to the next account.

Winchester.

The Directors of the Winchester Water and Gas Company submitted accounts for the year ended Dec. 31, 1932, which indicated that the balance of net revenue available for dividend was £12,153. Interim dividends of £2%, £2 15s.%, and £2 10s.% on the preference stocks and £2 10s.% on the consolidated ordinary stock, less income-tax, were paid on Sept. 1, and the Directors recommended the payment on March 1 next of final dividends of £2%, £2 15s.%, and £2 10s.% on the preference stocks and £3% on the consolidated ordinary stock, all less income-tax. The additional ½% on the consolidated ordinary stock represents the undivided portion of the authorized dividend for the half-year ended June 30, 1906. In spite of the industrial depression and the mild weather conditions the Directors report an increase in gas sales during the year of over 3 million c.ft. In response to the Mayor's appeal, the Directors have authorized the relaying of mains in Jewry Street and other roads within the city in order to give employment to additional labourers. Normally this work would not have been done until a later date. At the end of 1932 the Company installed an up-to-date coke breaking and grading plant, which is now working satisfactorily and has already proved of value in popularizing the use of coke. The Directors report with deep regret the death of Lieut.-Col. Sir John H. Mansell, K.B.E., D.L., who had been a Director and Vice-Chairman of the Company for eight years and whose services had been of very great value. Mr. W. P. Richardson, a duly qualified stockholder, has been elected a Director in his place.

Legal Intelligence.

Infringement of "Coalite" Trade Mark.

Mr. Justice Luxmoore, sitting in the Chancery Division, on Friday, March 24, heard a motion by Mr. Lindon, on behalf of Low Temperature Carbonisation, Ltd., against the Shoreham Shipping and Coal Company, for an injunction to restrain them from selling, or offering for sale, smokeless fuel not of plaintiffs' manufacture and passing off as and for the plaintiffs an inferior class of smokeless fuel and from infringing plaintiffs' trade marks, one of which was "Coalite."

Counsel said the defendants were now willing to treat the motion as the trial of the action and submit to a perpetual undertaking and pay the costs incurred by the plaintiffs.

Mr. Waddington (for the defendants) explained that the whole matter arose from a mistake. His clients only dealt in small quantities of "Coalite"—it was less than 0·25% of their total trade—so really there was little in it, but apparently, some of their workpeople put some more expensive fuel of this character in the "Coalite" bin and small quantities were sent out as "Coalite." Although his learned friend had stated that "trap" orders were given, defendants had not consciously done anything wrong, and they were prepared to observe the perpetual undertaking asked for.

Mr. Justice Luxmoore asked whether that undertaking would be in the terms of the notice of motion. If so, that would be sufficient. The order would be by consent, the motion to be regarded as the trial of the action. the defendants to pay the taxed costs, and plaintiffs to have liberty to apply.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The continued demand for gilt-edged securities was again the chief feature on the Stock Exchange last week, and prices of nearly all British Government stocks rose from 1 to 2 points. Money remains exceptionally cheap, and it is unfortunate that the existing uncertainty prohibits industry from taking full advantage of the situation. The result of the initial issue of the new 2½% Conversion Loan was entirely satisfactory to the Treasury, the average price received being £94 11s. 9·09d.%. Treasury bills were allotted at the new low record of 6s. 9·27d.%.

The Gas Market was particularly active throughout the week. In nearly all cases the recorded transactions were at prices above the previous week's best, and the values of a number of stocks improved in consequence. Plymouth and Stonehouse 5% headed the list with a rise of 12½ points to 155-165, business being done at 165. This Company has distributed an 8% dividend on this stock since the year to March 31, 1929, and the yield at this rate on the current middle market prices works out at exactly 5%. Brighton 5% consolidated, on which 6¾% has been paid since 1928, came next with a gain of 8 points to 140-145, and the yield in this case is £4 14s. 9d.%. Both European and Imperial Continental recovered the set-back of the previous week, the former rising 6 points to 134½, and the latter 7 points to 207; Barnet ordinary gained 5 points to 152½. It will be seen from the Stock and Share List that increases of from ½ to 2 points were numerous, and, with the exception of three *ex* div. reductions, no stocks were marked down.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *March* 27.

The position in the tar products market is as follows:

Pitch remains quiet, and the price is called 90s. to 92s. 6d. per ton f.o.b., according to period of shipment.

Creosote is about 2½d. to 3d. per gallon f.o.b. for B.E.S.A. Specification.

Refined tar is about 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 4d.; pure benzole, about 1s. 11d.; solvent naphtha, 95/160, about 1s. 7d. to 1s. 8d.; and 90/140 pyridine bases, 3s. 6d. to 3s. 9d. per gallon naked at makers' works.

Tar Products in the Provinces.

March 27.

The average prices of gas-works products during the week were: Gas-works tar, 34s. to 39s. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked, North, 1s. 9d. to 1s. 10d. Coal-tar crude naphtha, in bulk, North, 6d. to 6¼d. Solvent naphtha, naked, North, 1s. 5½d. to 1s. 6d. Heavy naphtha, North, 10d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2¼d. to 2¾d.; low gravity, 1¼d.; Scotland, 2¼d. to 2¾d. Heavy oils, in bulk, North, 4¾d. to 5¼d. Carbolic acid, 60's, 2s. 9d. to 2s. 10d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *March* 25.

Conditions remain unsettled with prices irregular. Inquiries are more plentiful however.

Crude gas-works tar.—The actual value is 42s. 6d. to 47s. 6d. per ton *ex* works.

Pitch.—Export value remains nominal at about 80s. to 85s. per ton f.o.b. Glasgow. Quotations for home delivery range from 85s. per ton in bulk *ex* works.

Refined tar to Ministry of Transport Specification continues quiet, but prices remain steady at 3¾d. per gallon f.o.r. naked.

Creosote oil.—There is over production and prices are easy. B.E.S.A. Specification is 2½d. to 3d. per gallon; low gravity, 2¼d. to 2¾d. per gallon; and neutral oil, 2½d. to 3d. per gallon; all *ex* works in bulk.

Cresylic acid.—Orders are scarce and prices show no change. Pale, 97/99%, is 10d. to 11d. per gallon; dark, 97/99%, 9d. to 10d. per gallon; and pale, 99/100%, 1s. 1d. to 1s. 2d. per gallon—all f.o.r. in buyers' packages.

Crude naphtha finds a ready outlet at 4½d. to 5d. per gallon *ex* works, according to quantity and quality.

Solvent naphtha is steady, but trading is on a small scale. 90/160 grade is 1s. 3d. to 1s. 4d. per gallon, and 90/190 grade 11d. to 1s. per gallon.

Motor benzole.—To-day's value is 1s. 4d. to 1s. 5d. per gallon *ex* works in bulk.

Pyridines.—90/160 grade is 2s. 9d. to 3s. per gallon, and 90/140 grade 3s. to 3s. 3d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time.

	s. d.		s. d.	
Crude benzole	0 10½	to	0 11	per gallon at works
Motor ,, ...	1 6½	,,	1 7	,, ,, ,,
Pure ,, ...	1 10	,,	1 11	,, ,, ,,

Parliamentary Intelligence.

[From Our Special Correspondents.]

House of Lords.

Special Orders.

The Special Order made on the application of the Swindon Gas Company has been reported from the Special Orders Committee and approved.

The petition against the Watford and St. Albans Gas Order has been withdrawn, subject to certain modifications and additions proposed by the Board of Trade. These modifications and additions were considered by the Special Orders Committee, who recommended their adoption. The Order has now been approved as amended.

The Sunderland Gas Order has been referred to the Special Orders Committee.

House of Commons.

Private Bills.

The petition of the British Gas Light Company against the Norwich Corporation Bill has been withdrawn.

The Agency for the Tilbury Urban District Council's petition against the Gas Light and Coke Company Bill has been changed. Messrs. Sharpe, Pritchard, & Co. have taken the place of Messrs. Lees & Co.

The petition of the Bridlington Gas Company against the Bridlington Corporation Bill has been withdrawn.

The Gas Light and Coke Company Bill and the Commercial Gas Bill have been referred to Group "C" Committee, consisting of Mr. David Reid (Chairman), Dr. John Williams, Mr. Lewis, and Mr. Wise.

Special Orders.

Plans have been deposited in connection with the Tenby Gas Order.

The Special Order promoted by the Swindon United Gas Company has been approved.

The Special Order promoted by the Watford and St. Albans Gas Company has been approved with certain modifications.

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDERS.

Burnham Gas Company, Ltd.

To extend the limits of supply, &c.

Chester United Gas Company.

To extend the limits of supply; to prohibit the Connah's Quay Gas Company, Ltd., from exercising within the existing limits of supply of the Company or the added area any of the powers conferred upon them by any enactment in respect of the supply of gas; to empower the Company to acquire additional lands; and for other purposes.

Tenby Gas Consumers' Company, Ltd.

To define the limits of supply and the capital and borrowing powers of the Company; to authorize the therm basis of charge; and to make various other provisions.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see earlier page.]

Issue. £	Share	When ex-Dividend	Dividends. Prev. Hf.-Yr. % p.a.	Dividends. Last Hf.-Yr. % p.a.	NAME.	Quotations March 25. (Provincial Exchanges March 24.)	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week
1,551,868	Stk.	Oct 3	7½	7½	Alliance & Dublin Ord. ...	115—125	...	118—119
374,000	..	Jan. 9	4	4	Do. 4 p.c. Deb. ...	85—95	...	...
557,655	..	Mar. 6	7	7	Barnet Ord. 7 p.c.	150—155	+5	...
300,000	1	Oct. 17	1·92	1·42	Bombay, Ltd.	24/6—26/6	...	25/6
178,280	Stk.	Feb. 20	9½	9½	Bournemouth sliding scale	192—202	...	...
550,050	..	..	7	7	Do. 7 p.c. max. ...	152—162	...	155½ 159
439,160	..	..	6	6	Do. 6 p.c. Pref. ...	137—142	...	...
50,000	..	Dec. 19	3	3	Do. 3 p.c. Deb. ...	75—80	...	...
162,025	..	..	4	4	Do. 4 p.c. Deb. ...	101—106	+3	104½—104⅞
210,000	..	..	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
357,900	..	Mar. 6	7½	7½	Brighton, &c. 6 p.c. Con. ...	141—146	...	...
540,000	..	..	6⅔	6⅔	Do. 5 p.c. Con. ...	140—145	+8	140—140½
195,500	..	..	6	6	Do. 6 p.c. B Pref.	133—143*	...	...
1,487,500	..	Mar. 6	5	5	Bristol 5 p.c. max.	109—111*a*	...	...
120,420	..	Dec. 19	4	4	Do. 1st 4 p.c. Deb.	99—101*a*	...	...
217,870	..	..	4	4	Do. 2nd 4 p.c. Deb. ...	99—100*a*	...	...
328,790	..	..	5	5	Do. 5 p.c. Deb.	120—124*a*	...	...
855,000	..	Oct. 3	8	7	British Ord.	145—150	...	147½—149
100,000	..	Dec. 19	7	7	Do. 7 p.c. Pref.	140—150	...	147
350,000	..	..	—	5½	Do. 5½ p.c. Pref. ...	105—110	...	...
120,000	..	..	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	..	..	5	5	Do. 5 p.c. Red. Deb. ...	105—115	...	...
160,000	..	Jan. 9	5	5	Cambridge 5 p.c. Deb. ...	117—122	...	...
100,000	10	Dec. 5	6	6	Cape Town, Ltd.	7⅛—8¼	...	...
100,000	10	Nov. 7	4½	4½	Do. 4½ p.c. Pref. ...	6—7	...	...
150,000	Stk.	Dec. 19	4½	4½	Do. 4½ p.c. Deb. ...	88—93	...	...
626,860	..	Feb. 20	6	6	Cardiff Con. Ord.	108—113	...	...
237,860	..	Jan. 9	2½	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	..	Feb. 20	5	6½	Chester 5 p.c. Ord.	93—98*b*	...	...
98,936	1	Oct. 17	2/-	2/-	Colombo, Ltd. Ord.... ...	25/—30/-	...	...
24,500	1	Oct. 17	1/4⅛	1/4⅛	Do. 7 p.c. Pref. ...	19/—21/-	...	20/—20/3
609,204	1	Mar. 20	-/11'48	-/11'48	Colonial Gas Assn. Ltd. Ord.	15/6—17/6*	—/6	...
296,053	1	..	1/8'30	1/8'30	Do. 8 p.c. Pref.	19/—21/-*	—/6	...
1,796,955	Stk.	Feb. 20	5	6½	Commercial Ord.	112—117	...	115—117
475,000	..	Dec. 19	3	3	Do. 3 p.c. Deb. ...	75—80	...	79½
265,272	..	Mar. 6	—	5	Do. 5 p.c. Deb. ...	119—124	+1	121—123
807,560	..	Feb. 20	7	7	Croydon sliding scale	143—148	...	147
469,590	..	..	5	5	Do. max. div.	100—105	...	101
500,000	..	Jan. 9	5	5	Do. 5 p.c. Deb.	117—122	...	119
542,270	..	Mar. 6	7	10	Derby Con.	150—160*c*	...	...
55,000	..	Jan. 9	4	4	Do. 4 p.c. Deb.	80—85*c*	...	...
209,000	..	Mar. 6	5	5	East Hull Ord. 5 p.c. ...	100—105	...	104½—104¾
179,500	..	Mar. 6	6	6	East Surrey Ord. 5 p.c. ...	118—123	...	...
155,019	..	Dec. 19	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
1,002,180	..	Sept. 19	†6½	†5	European, Ltd.	132—137	+6	128½—136
19,373,992	..	Feb. 20	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	25/—26/-*f*	...	25/4½—25/10½
2,600,000	..	..	3½	3½	Do. 3½ p.c. max.	82—87	...	85¾—86
4,477,106	..	..	4	4	Do. 4 p.c. Con. Pref. ...	101—104	...	102½—104
6,102,497	..	Dec. 19	3	3	Do. 3 p.c. Con. Deb. ...	80—83	+½	81—82
3,642,770	..	..	5	5	Do. 5 p.c. Red. Deb. ...	115—118	+½	116½—117½
3,500,000	..	..	4½	4½	Do. 4½ p.c. Red. Deb. ...	110—113	...	111½—112½
270,466	..	Mar. 6	6	6	Harrogate New Cons. ...	112—118	+½	117½
82,500	..	Mar. 6	7	7	Hastings & St. L. 5 p.c. Conv.	130—140	...	...
258,740	..	..	5½	5½	Do. 3½ p.c. Conv.	105—110	...	108½
70,000	10	Oct. 17	†10	†10	Hongkong & China, Ltd. ...	10½—11½	...	...
213,200	Stk.	Mar. 6	6	6	Hornsey Con. 3½ p.c. ...	122—127	...	...
5,600,000	..	Nov. 21	14	10	Imperial Continental Cap.	202—212	+7	202—209
223,130	..	Feb. 6	3½	3½	Do. 3½ p.c. Red. Deb.	89—94	...	...
235,342	..	Mar. 6	8½	8½	Lea Bridge 5 p.c. Ord. ...	168—173	...	...
2,145,907	..	Mar. 6	6	6	Liverpool 5 p.c. Ord. ...	124—126*b*	...	...
245,500	..	Dec. 19	5	5	Do. 5 p.c. Red. Pref. ...	105—115*b*	...	...
306,083	..	Jan. 19	4	4	Do. 4 p.c. Deb. ...	101—103*b*	...	...
165,736	..	Feb. 20	8	10	Maidstone 5 p.c. Cap. ...	180—200	...	...
56,176	..	Dec. 19	3	3	Do. 3 p.c. Deb. ...	68—73	...	...
75,000	5	Dec. 5	†10	†10	Malta & Mediterranean ...	8—9	...	...
392,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	98—103	...	...
231,978	Stk.	Mar. 6	5	5	M. S. Utility "C." Cons. ...	98—103	...	...
818,657	..	..	4	4	Do. 4 p.c. Cons. Pref.	92—97	...	95—96
112,126	..	Jan. 9	4	4	Do. 4 p.c. Deb. ...	102—104	+1	102½
148,955	..	..	5	5	Do. 5 p.c. Deb. ...	115—120	...	...
675,000	..	21 May '31	†6	†6	Montevideo, Ltd.	35—45	...	...
2,061,315	..	Mar. 6	5	5½	Newcastle & Gateshead Con.	24/—24/6*d*	+·/3	...
682,856	..	..	4	4	Do. 4 p.c. Pref. ...	99—101*d*	+3½	...
776,706	..	Jan. 9	3½	3½	Do. 3½ p.c. Deb. ...	89—91*d*	...	...
277,285	..	Nov. 7	5	5	Do. 5 p.c. Deb. '49...	103—107*d*	...	...
274,000	..	Feb. 20	5	5	Newport (Mon.) 5 p.c. max.	99—101*a*	+1	...
204,940	..	Mar. 20	7½	7½	North Middlesex 6 p.c. Con.	132—142*	−3	...
396,160	..	Feb. 6	5	5	Northampton 5 p.c. max. ...	98—103	...	...
300,000	..	Dec. 5	7	9	Oriental, Ltd.	112—117	...	...
205,162	..	Dec. 19	8	8	Plym'th & Stonehouse 5 p.c.	155—165	+12½	...
504,416	..	Feb. 20	8	8	Portsm'th Con. Stk. 4 p.c. Std.	160—165	+2	165
241,446	..	..	5	5	Do. 5 p.c. max. ...	102—107	...	...
114,000	..	Feb. 20	5	5	Preston 5 p.c. Pref.	103—108	...	...
686,312	..	Jan. 23	4	4	Primitiva 4 p.c. Rd. Db. 1911	82—87	...	...
389,813	..	Dec. 19	4	4	Do. 4 p.c. Cons. Deb.	82—87	...	...
150,000	10	Mar. 20	6	6	San Paulo 6 p.c. Pref. ...	6⅞—7⅛*	−⅛	...
1,736,968	Stk.	Sept. 5	6	6	Sheffield Cons.	116—117*e*	...	...
95,000	..	Jan. 9	4	4	Do. 4 p.c. Deb.	91—95*e*	...	...
133,201	..	Feb. 20	8½	5	Shrewsbury 5 p.c. Ord. ...	125—130	...	...
90,000	10	June 6	15	15	South African	3—5	...	...
6,709,895	Stk.	Feb. 20	5	7	South Met. Ord.	126—129	...	127—128½
1,135,812	..	..	6	6	Do. 6 p.c. Irred. Pf.	138—143	...	139½—141¼
850,000	..	..	—	20/-*g*	Do. 4 p.c. Irred. Pf.	101—104	...	103¾—103½
1,895,445	..	Jan. 9	3	3	Do. 3 p.c. Deb. ...	78—83	...	81
1 000,000	..	Jan. 23	5	5	Do. 5 p.c. Red. Deb.	110—115	...	...
209,820	..	Mar. 6	8½	8½	South Shields Con.	147½—152½*d*	...	...
1,543,795	..	Feb. 20	6	6	South Suburban Ord. 5 p.c.	123—128	...	127—128
300,000	..	..	5	5	Do. 5 p.c. Pref.	112—117	...	115½—116½
868,837	..	Dec. 19	5	5	Do. 5 p.c. Deb.	120—125	...	...
647,740	..	Feb. 20	5	5	Southampt'n Ord. 5 p.c. max.	107—112	+2	109—110
121,275	..	Dec. 19	4	4	Do. 4 p.c. Deb.	100—105	+2	102½—103
350,000	..	Mar. 6	2/-	5½	Swansea 5½ p.c. Red. Pref.	108—112	...	111
200,000	..	Dec. 19	6½	6½	Do. 6½ p.c. Red. Deb.	105—110	+2	...
1,076,490	..	Mar. 6	6⅔	6⅔	Tottenham and District Ord.	142—147	+2	143—146
300,000	..	..	5½	5½	Do. 5½ p.c. Pref. ...	118—123	...	...
199,005	..	Dec. 19	4	4	Do. 4 p.c. Deb. ...	98—103	...	...
85,701	..	Sept. 19	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	75—80	...	...
347,769	..	Mar. 6	7	7	Uxbridge, &c., 5 p.c. ...	135—140	...	...
88,330	..	..	5	5	Do. 5 p.c. Pref. ...	108—113	...	...
1,322,220	..	Mar. 6	7	7	Wandsworth Consolidated	140—145	...	146
1,096,373	..	..	5	5	Do. 5 p.c. Pref.	112—117	...	...
1,317,964	..	Dec. 19	5	5	Do. 5 p.c. Deb.	120—125	...	122
158,400	..	Mar. 6	5	6A	Winchester W.&G.5p.c.Cor.	105—110	...	...

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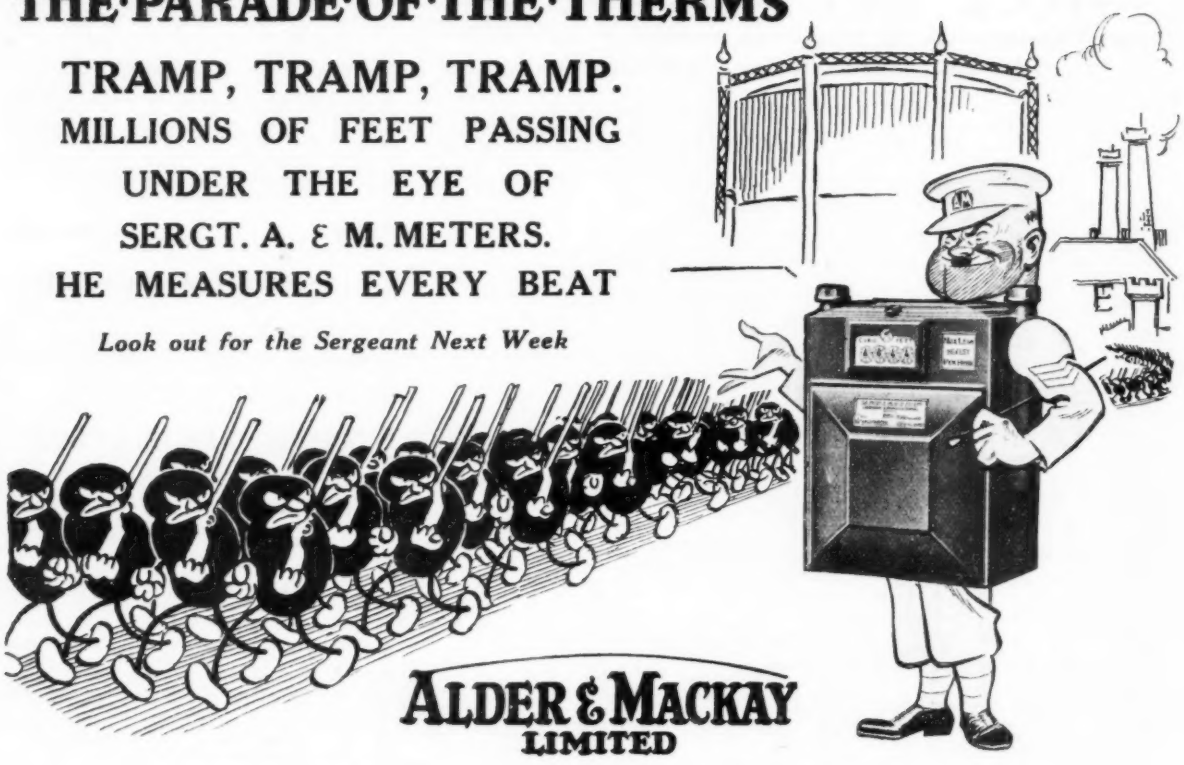

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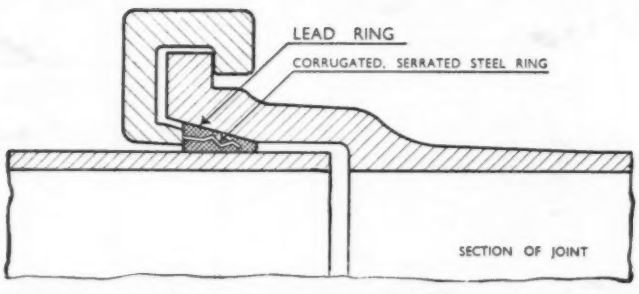

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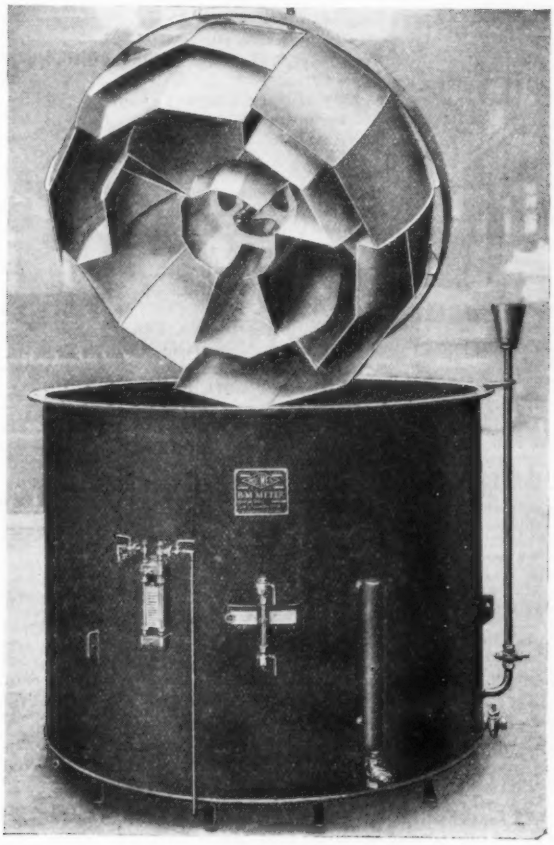

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Wilsons & Mathiesons, Ltd.	—
Withinshaw, A.	—
Woodall-Duckham Co., Ltd. Centre I.	
Wright, Alex., & Co., Ltd. Centre IX.	
Wright, John, & Co.	—

Agencies	829
Appointments Vacant and Wanted	829, 830
Bye-Products Wanted	—
Company Notices	—
Contracts Open	—
Notice	—
Partnership Wanted	829
Patents	829
Plant, &c., for Sale and Wanted	830
Premium Pupil	—
Publications	—
Stock Issue	—

INDEX

January to March, 1933.

[For Index of Legal Intelligence, Correspondence, Parliamentary Intelligence, and Register of Patents, see p. vii.]

Aberystwyth Gas Company, 637
Accidents—
  Cambridge, 253
  Electrocution at Liverpool, 308
  Gateshead, 258
  Slough, 305
  Snow Damage in Yorkshire, 610
Accounts—
  Continuous Meter Reading and Billing for Quarterly Consumers, 30, 359
  Metropolitan Companies', 302
Accrington Gas Department, Gas-Driven 'Buses Considered, 538
Advertising, Gas in 1932, 139
Airdrie Gas Department, Prospective Saving in Income-Tax, 90
Alnwick Gas Company, 699
Altrincham Gas Company, 699
Amal, Ltd., Uniform Jets, 87, 93
Amalgamations—
  Cheltenham and Pershore, 608
  Spennymoor and Coxhoe, 32
American Gas Association—
  Gas at the 1933 Chicago Exhibition, 306
  United States Gas Statistics, 365
Ammonia, Situation in Sweden, 95
Anderson, A. R., Tar and Liquor Separator, 148
Andover Lighting and Power Company, 761
Auckland Gas Company (N.Z.), 822
Australian Gas Industry, Statistics, 799
Australian Gas Institute—
  Dobson, A. J., Rate Structure as a Business Builder, 208
  Presidential Address of S. J. Janes, 799, 818
  Ternes, O. A., Experiences of Silica in Continuous Vertical Plant, 146
  Woodbridge, G. W., Gas Rates, 206
Austria, Bartering for Coal, 32

Baking Ovens—
  "Brungas" System, 743
  How Gas Can Help the Baker, 736
Ballymena Gas Department, Cookery Demonstrations, 538
Bangor (Co. Down) Gas Department—
  Chairman's Supper, 672
  New Demonstration Room, 305, 368
Barbados Gas Company, Cookery Installation, 255
Barnet District Gas and Water Company—
  New Purifier Plant, 141
  Results, 699
Barnstaple Gas Company, 699
Basic Charges, Parliamentary Inquiry, 44, 86
Bath Gas Company, 637
Belfast Gas Department, Extensions, 140
Belgium, Gas Supply in Charleroi, 32
Bell's Asbestos and Engineering Supplies, Ltd., Twenty-Four-Hour Day Service, 589
Bennett, C. Valon, Address to Scottish Junior Gas Association, 144
Benzole—
  Inhibitor Process, 137, 304
  Theoretical Aspects of Recovery, 731, 750, 814
Bills—
  Commercial, 153
  East Hull, 153
  Gas Light, 153
  South Metropolitan, 153
  South Suburban, 153, 696, 758
Bilston Gas Light and Coke Company, Scheme for Improved Lighting, 32
Birmingham and District Master Gasfitters' Association, Annual Dinner, 464
Blakeley, W., Neunkirchen Explosion, 536
Blyth Gas Company—
  Price Reduction, 538
  Results, 824
Board of Trade, Gas Undertakings Returns, 676
Boness Gas Light Company, C.W.G. Installation, 463
Books, Reviews, &c.—
  Assessment of Gas Undertakings, 254
  British Chemicals and Their Manufacturers, 260
  Brush Up Your German, 673
  Cause and Effect, 260
  Combustion in the Boiler Furnace, 260
  Even Better Selling, 368
  Gas Calorimetry, 36
  Gas Journal Calendar and Directory, 31
  Handbook for Investors, 103
  Incorporated Accountants' Year Book, 195
  Manual of Gas-Works Chemistry, 543
  Mechanical World Electrical Pocket Book, 260
  Mechanical World Year Book, 103
  Smoke Particles and Condensation Nuclei, 312
  Specification, 467
  The "Turner" Retort, 36
Bournemouth Gas and Water Company—
  Annual Meeting, 474
  Christmas Window Display, 33
  Dividends, 359
  Potential Investment, 255
  Report, 381
Bradbury, J., Gas in the Wire Drawing Industry, 199, 263
Bradfield, F. J., Analysis of the London and Suburban Companies' Accounts, 535, 544
Bradford Gas Department, Appreciation of Staff's Work, 673
Brass, J., Petrol from Coal, 310
Bratt Colbran & Co., "Portcullis" Portable Fire, 695
Brayshaw, S. N., Gas Furnaces, 676
Bribery and Secret Commissions Prevention League, Luncheon to Inaugurate Sir David Milne-Watson to Presidency, 745
Briggs, F. C., Lecture to Dudley Rotarians, 365
Brighouse Gas Department, New Scale of Charges, 670, 674, 738
Brighton, Hove, and Worthing Gas Company—
  Annual Meeting, 637
  Potential Investment, 142
  Unfair Electrical Discrimination, 609
Bristol Gas Company—
  Industrial Department, 251
  Results, 638
  Staff Dinner, 740
  Temporary Showrooms, 551
British Columbia Electric Power and Gas Company, Vancouver's New Carbonizing Plant, 739
British Commercial Gas Association—
  Joint Conference of National Bodies, 356
  Paper before Joint Gas Conference, 679
British Gas Light Company—
  Annual Meeting, 823
  Hull Cricket Section's Dance, 367
  Norwich Children's Party, 139
  Report, 740
British Industries Fair—
  Accommodation at Leamington Spa, 90
  Advance Guides, 151
  Buildings to be Enlarged, 612
  Editorial Comments, 456
  Gas at White City, 540
  Gas Exhibits, 478
  Hopeful Prospects, 91
  Joint Gas Conference, *see* Joint
British Industries Fair—(*continued*)
  Lighting, 538
  Miscellaneous Exhibits, 498
  Olympia Section, 612
  Opening, 458
  Plan of Gas Section, 259, 477
  Programme of Gas Industries Section, 306
  Royal Visits, 463
  The 1933 Fair, 604
  Visit by Junior Gas Associations, 558
  Visit by Salesmen's Circles, 560
British Mannesmann Tube Company, 572
British Rema Manufacturing Company, Ltd., 764
British Road Tar Association, Tar Film Bookings, 34, 310, 610
British Rubber Manufacturers' Research Association, Tests on Rubber Jointing Rings, 798, 809
British Science Guild, Symposium on Coal Utilization, 673
British Standards Institution, Coal Tar Naphthas Specification, 540
British Sulphate of Ammonia Federation, Ltd., Sulphate of Ammonia Prices, 28, 53
British Thomson-Houston Company, Ltd., Technical Progress During 1932, 141
Broadbent, Thomas, & Sons, Ltd., 154
Burnham-on-Sea Gas Company—
  Results, 824
  Special Order, 826
Burnley Gas Department—
  "Brungas" Baking Ovens, 743
  Post of Deputy Engineer and Manager, 90
  Progress of, 142
Bush, Beach, & Gent, Ltd., New High-Temperature Furnace, 321

Calorimeters, Automatic Cut-Off for, 51
Cambridge University and Town Gaslight Company, 761
Campbell, W., Control of Retort Bench Vacuum, 149
Canning, J. H., Technical Education, 257
Cannon Iron Foundries, Ltd.—
  "Champion" Cooker, 625
  Cookery Book, 608
Canterbury Gas and Water Company, 638
Carbon Monoxide—
  British Investigation by E. M. Killick, 262
  Effects of Exposure to, 252, 261
Carbonization—
  Coal Testing and Other Aids in the Control of, 754
  Of Screened, Mixed, and Blended Coals, 357, 370
  With 103-in. Vertical Retorts, 303, 316
Cardiff Gas Light and Coke Company, 824
Carmichael, T., Continuous Meter Reading and Billing for Quarterly Consumers, 359
Carpenter, Dr. C., The Neunkirchen Gasholder Explosion, 536
Carr, W. M.—
  Continuous Meter Reading, 30
  Industrial Uses of Gas, 552, 626
Census of Production, Fourth (1930), 86, 94
Chamber Ovens, Novel Type, 466
Charges—
  Legislation Committee's Work, 250
  Multiple Basic Prices Report, 254
Cheltenham and District Gas Company—
  Boiler Consignment for Advertising, 673
  Pershore Amalgamation, 608
Chester United Gas Company, 638, 761, 826

Chesterfield Gas Department—
Cookery Demonstrations, 92
Gas-Driven 'Bus Experimental Run, 367
Chesterton Gas Department, Acquisition of Cottenham, 89
City and Guilds of London Institute, Report, 140
Clacton Gas Department, Inauguration of "W.-D." Installation, 806
Clayton, Dr. G. C., Presidential Address before Joint Gas Conference, 621
Cleland, A. McI., Opening of Garston Gasholder, 305
Clitheroe Gas Department, Official's Service, 608
Coal—
Carbonization of Screened, Mixed, and Blended, 357, 370
Oil from, 193, 691
Petrol from, 310
Review by A. L. Curtis, 608
Versus Oil, 799
Coal Industry, Future of, 256
Coal Industry Society, The Future of the Coal Industry, 256
Coal Mines Act, Dr. Carpenter's Statement, 357
Coal Utilization Council—
Aims and Policy, 538
Market Investigation and the Gas Industry, 255
Coke—
For the Open Fire, 540, 609, 734, 737, 740
Mechanism of Formation, 813
Coke Handling Plant, Copp, D. L., on, 376
Coke Oven Gas, Production of Organic Compounds from, 191, 202
Coleraine Gas Department, Supply to Portstewart, 672
Colonial Gas Association—
Annual Meeting, 46
Gold Medal, 307
Colwyn Bay Gas Department, 89
Combustion, of Solid, Liquid, and Gaseous Industrial Fuels, 96
Commercial Gas Company—
Accounts, 303, 307
Annual Meeting, 384
Bill, 153
Dividends, 193
London Junior Association Visit Wapping, 101
Company Registrations during 1932, 258
Conjoint Conference of Public Utility Associations, Combined Co-operation, 539
Consolidated Gas Company (New York)—
Dedication of War Memorial, 34
Increase in Stockholders, 800
Window Displays, 257
Consumers' Gas Company of Toronto, Gas for Industries, 308
Continental Notes—
Ammonia Situation in Sweden, 95
New Catalytic Method for the Determination of Hydrogen, 810
Novel Type of Intermittent Chamber Oven, 466
Slide Rules for Gas Main Calculations, 39
Waterless Gasholders—New Construction Principle, 312
Cookers, Cleaners for, 737
Copenhagen Gas-Works, 75th Anniversary, 254
Copp, D. L., Coke-Handling Plant, 376
Cowan, W. & B., Gas Meters, 805
Creosote, as Motor Fuel—Tests at Salford, 369
Croydon Gas Company—
Annual Meeting, 389
Display of Clinical Gas Lamps, 311
Potential Investment, 92
Cupar Gas Company, Price Reduction, 672

Darlington Gas Department—
Increased Output, 32
Profits, 672
Sanction to Borrow, 538
Davis, E. S., Gas in Industry, 98
Dawlish Gas and Coke Company, Share Sale, 306
Deal and Walmer Gas Company, Sports Club Dinner, 676
Dechamps, G., Production of Organic Compounds from Coke Oven Gas, 202
Dent, F. J., Aspects of Water Gas Manufacture, 565
Department of Scientific and Industrial Research, Further Tests on the "Turner" Retort, 36
Derby Gas Light and Coke Company, 824
Derby Society of Engineers, Jubilee Dinner, 193
Devon Gas Association, 322
Diaries, Calendars, &c., Received, 104
Director of Gas Administration, Offices, 359
Distribution, Notes by P. Richbell, 468, 562
Dixon, G., Presidential Address before Manchester District Association of Gas Engineers, 671, 692
Dobson, A. J., Rate Structure as a Business Builder, 208
Doncaster Gas Department, Cookery Demonstrations, 736
Dorchester Gas and Coke Company, 638
Douglas Gas Light Company, 824
Downs, F. S., Control of Retort Bench Vacuum, 537
Drying, Modern Gas-Heated Equipment for Industrial Processes, 28, 47
Dudley, Brierley Hill, and District Gas Company—New Scales of Charges, 738
Results, 761
Dunbar Gas Department, Price Reduction, 736
Dundee Gas Department, 701
Dunn, W. T.—
Dickens' Dramatic Recital, 802
Lecture before Hastings Branch of Toc H, 195
Durham Gas Company, 762

East Grinstead Gas Company, 762
East Hull Gas Company, Bill, 153
East Surrey Gas Company—
Dividends, 305
Results, 638
Eastbourne Gas Company—
Development and Progress, 610
Results, 699
Economy—
Spending for Efficiency, 607
Wise Spending, 605
Edinburgh Gas Department—
Alteration of Calorific Value, 308
Gas Examiner's Report, 254
Record Output by Granton Works, 608
Redemption of Annuities, 310
Education—
For Commerce, 464
Technical Training of Chinese Students in the United Kingdom, 367
Edwards, R. W., Need for More Co Partnership, 194
Electricity—
A Comparison, 463
A Pampered Industry, 258
A Remarkable Statement, 609
And Competition, 739
Cambridge Grid Failure, 257
Cost of the Grid, 736
Disfiguring the Landscape, 798
Dissatisfaction with, at Smethwick, 306
Heating of Prison Cell, 736
School Heating by, 684
Unfair Discrimination at Brighton, 609
Used in Gas-Works, 140
Electrolux, Ltd., Win International Trophy, 464
Elmesan (London), Ltd., "K.D." Desiccator, 465
European Gas Company—
Annual Meeting, 820
Report, 675
Ewart & Sons, Ltd., 309
Exeter Gaslight and Coke Company, 824
Exhausters, Facilitating Change-Over, 143
Exhibitions—
Display Exhibition Planned for Olympia, 674
South London, 539, 685
Southampton, 744
Explosions—
Caused by Chandelier at Stockton, 307
Gateshead, 801
Neunkirchen, 361, 356, 460, 456, 611
Stoke-on-Trent, 256

Faversham Gas Company, Cookery Demonstrations, 800
Finlayson, T. Campbell, Review of "Back to the Coal Standard," 490
Fleetwood Gas Company, 322
Floodlighting—
Hitchin, 139
Housing Estates, 804
Liverpool, 253
West Hartlepool, 92
Foster, A. Lindsay, Heat Insulation, 566
Foxwell, Dr. G. E.—
Mechanism of Coke Formation, 813
Salesmanship in the Fuel Industries, 624
Fraser and Chalmers Engineering Works, "Adra" Fans, 748
Fuel Research Board—
Coke in the Open Firegrate, 740
Report, 734
Technical Paper No. 35—New Brick Retorts, 735
Furnaces—
Brayshaw, S. N., on, 676
Historical Development of, 318

Gardner, D., Water Softening and Boiler Practice, 52
Gas—
As a Motor Fuel, 802
Competition in "John o' London's Weekly," 90
Escapes and Fires, 29
For Commercial and Industrial Purposes, 607
In Industry, 87, 98
In the Royal Mint, 40
In the Tinplate and Sheet Industries, 313
In the Wire Drawing Industry, 199, 263
Industrial Uses of, 552, 605
Notable Change-Over in Derby, 89
Oxide Purification, 357
Versus Electricity at Morden, 256
Gas Chambers and Coke Ovens, Ltd., Tests at Pont Brûlé, 467
Gas Development Centres, 534, 545
Gas-Driven Vehicles—
Chesterfield Experimental Run, 367
Demonstrations at B.I.F., 560
Gas Industry—
Magnitude of, 539
"Times" Review, 364
"Western Mail" Supplement, 140
Why Not a Women's Gas Association? 537
GAS JOURNAL—
Calendar and Directory, Review of 1933 Edition, 31
Technical Signpost to Vol. 200, 617
Gas Legislation Committee, Gas Charges, 250
Gas Light and Coke Company—
Accounts, 302, 307
Advertising, 139, 254
Annual Meeting, 379
Bill, 153, 801
Controlling Interest in South-Eastern Gas Corporation, 357
Dividends, 254
Exhibit at London Section of the B.I.F., 612
Rayleigh Showrooms Opened, 811
Gas Referees, Metropolitan Companies' Official Testing, 216
Gas Sampling, A Continental Device, 368
Gas-Works—
Clacton, 806
St. Ives (Cornwall), 140
Stirling, 254, 746
Wapping, 101
Gasholders—
Construction Principle of Waterless, 312
Globe-Shaped at Prague, 32
Lighting of, 91
Representation of Waterless, 538
General Electric Co., Ltd., London and Southern District Junior Gas Association Visit Research Laboratories, 306
Gibbons (Dudley), Ltd., and Gibbons Bros., Ltd., 736
Glasgow Gas Department—
Brass Band Success, 736
Maclaurin Plant to be Sold, 90
Motor Spirit Produced, 800
Gloucester Gas Light Company, 762
Glover-West Installations—
In Hand, 803
Stirling, 254, 746
Goodenough, Sir Francis, Business and the Schools, 194
Gordon, J., & Co., Ltd., Pressure Reducing Valves, 104
Gosport District Gas Company, 824
Gravesend and Milton Gas Light Company, Employees' Dinner, 538
Gray, Jas., & Sons, "Escol" Enamels, 560
Greenock Gas Department, 89
Guildford Gas Company, Early Gas Lamp, 800

Halifax Gas Department—
Fire in Meter Stores, 538
Joint Gas and Electricity Departments Discussed, 674
Halkett, R., Advice to Young Students, 195
Harrogate Gas Department, 762
Hartlepool Gas and Water Company—
Floodlighting, 92
Results, 638
Hastings and St. Leonards Gas Company—
Municipal Economy (?), 674
Results, 825
Haworth Gas Department, Showrooms, 89
Helps, G., Solid Smokeless Fuel, 305
Hereford Gas Department—
Cookery Demonstrations, 89
High-Pressure Lighting, 463
Sale, 672
Hexham Gas Company, 699
Hinckley Gas Department, 195
Hind, W., Modern Gas-Heated Equipment for Industrial Drying Processes, 28, 47
Hitchin and District Gas Company, Floodlighting of Parish Church, 139
Hodsman, H. J., Coke for Open Fires, 737
Holliday, H. B., Address to Wallasey Rotary Club, 305
Hollings, H., Carbonization of Screened, Mixed, and Blended Coals, 370
Holmes, W. C., & Co., Ltd.—
Modern Gas Cooling Practice, 543
Pioneer Gas Apparatus Calendar, 34
Horley District Gas Company, 476
Hornsey Gas Company—
Annual Meeting, 634
Directors' Report, 539
Howells, A. D., Application of Gas to the Tinplate and Sheet Industries, 313
Hungary, Barter for Coal, 32
Hydrogen, New Catalytic Method for Determination of, 810
Hygienic Stove Company, Ltd., Gas Fires, 95

Ideal Home Exhibition, Preliminary Announcement, 359
Ilfracombe Gas Company—
Public Lighting, 672
Results, 825
Special Order, 35

Ilkeston Gas Department—
All-Gas House, 672
Price Reduction, 672
Illuminating Engineering Society—
Annual Dinner, 364
Lectures at Regent Street Polytechnic, 34
Visit to Watson House, 145
Imperial Continental Gas Association, Potential Investment, 608
Institute of Arbitrators, Examinations, 673
Institute of Fuel—
Foster, A. Lindsay, Heat Insulation, 566
Osterrieth, J. W., and Dechamps, G., Production of Organic Compounds from Coke Oven Gas, 191, 202
Institution of Chemical Engineers, Annual Meeting and Dinner, 466
Institution of Engineers-in-Charge, Annual Dinner, 803
Institution of Gas Engineers—
Classification, Rating, and Standardization of Meters, 463
Examinations, 366
German Gasholder Accident, 540, 737
Joint Conference of National Bodies, 356
Whitsun Cruise, 737
Institution of Heating and Ventilating Engineers, Proceedings, 541
Insulation—
By Aluminium Foil, 798
Heat, 566
Ipswich Gas Light Company—
Activities During National Mark Week, 739
Results, 762
Isle of Thanet Gas Light and Coke Company—
Exhibition, 801
Results, 638

Janes, S. J., Presidential Address before the Australian Gas Institute, 818
Johns, W. H., Contribution to South Wales Trade and Industrial Supplement, 195
Joint Gas Conference—
Carr, Col. W. M., Industrial Uses of Gas, 552, 626
Gas and Gas Coke for Hot Water Supply, 679
Presidential Address of Dr. G. C. Clayton, 604, 621
Joints, Tests on Rubber Rings, 798, 809
Junior Gas Associations, Visit to the B.I.F., 558

Keighley Gas Department, Coke for Unemployed, 736
Keillor, R. D., Facilitating Exhauster Change-Over, 143
Keith & Blackman Co., Ltd., 764
Kempton, C. H., & Co., Ltd., Asymmetrical Lamp, 805
Kendal Gas Department, Cookery Demonstrations, 739
Kidderminster Gas Company, Waterless Gasholder, 675
Killick, Dr. E. M., Investigation on Effects of Exposure to Carbon Monoxide, 262
Kilmarnock Gas Department, Annual Re-Union, 672
King's Message, 28
Kleenup-Astrah Products, 609

Lander, Dr. C. H., Oil from Coal, 691
Lea Bridge District Gas Company, Annual Meeting, 636
Lead Wool Co., Ltd., Portable Air Compressors, 152
Leamington Priors Gas Company, Exhibition House, 193
Leatherhead Gas Company, 699
Lecocq Company, Coke Oven Plant, 152
Leeds Gas Department, Cookery Demonstrations, 194, 369, 538
Leeds University, Annual Dinner of Fuel Department, 800
Legislation, South Metropolitan Gas Company Bill, 190
Lessing, Dr. R., Trend of Modern Engineering, 310
Liberty, Capt. W. J., Lecture, 359
Lighting—
Edmonton, 608
Historical—William Matthews, 670
Islington Cattle Market, 34
Of Curling Rink, 616
Referred to by Company Chairmen, 356
Street Names, 90
Weymouth, 609
Lighting Trades and Welsbach Light Company, Ltd., Sports Club Dinner, 193
Liverpool Gas Company—
Census of Gas Fires, 256
Floodlighting in Exchange Station, 253
Inauguration of Gasholder in 1892, 254, 305
Potential Investment, 673
Reduced Charges, 608
Results, 638
London and Counties Coke Association, Industrial Coke Brochure, 542
London and Southern District Junior Gas Association—
Richbell, P., Notes on Distribution, 468, 562
Visit to G.E.C. Laboratories, 306
Visit to Staveley Coal and Iron Company, 677
Visit to Wapping Gas-Works, 101
Wearing, C. M., Theoretical Aspects of Benzole Recovery, 734, 750, 814
London County Council and Gas Bills, 309
Long Eaton Gas Company, 699
Low Temperature Carbonisation, Ltd.—
Contract for Aviation Petrol, 674
Infringement of "Coalite" Trade Mark, 825
Injunction, 631
Oil Fuel for the Navy, 360
Low-Temperature Carbonization, Further Tests on the "Turner" Retort, 36
Lurgan Gas Department, New Showrooms, 539
Luxon, R. G., Lecture on Clinical Lamp, 365

Main, R. & A., Ltd., Storage Water Heaters, 472
Malton Gas Company, 699
Management Factor in Industry, Manifesto, 136
Manchester and District Junior Gas Association—
Rhead, F. A., Carbonization with 10½-In. Vertical Retorts, 316
Visit to York, 802
Manchester District Association of Gas Engineers—
Annual Meeting and Presidential Address of G. Dixon, 671, 692
Brayshaw, S. N., Gas Furnaces, 676
Hollings, H., Carbonization of Screened, Mixed, and Blended Coals, 370
Manchester Gas Department, Price Reduction, 305
Mansfield Gas Department, 89
Marshall, F. D., Oil from Coal, 193
Maryborough (Queensland) Gas and Coke Company, 822
Masonic, Evening Star Lodge—Ladies' Festival, 539
Masters, J. R., & Sons, Ltd., 54
Matlock and District Gas Company, 700
Metal Melting, Continuous, 749
Meters—
Ownership of Money in Prepayment, 29, 33
Re-Verification of, Meeting in Manchester, 561
Robberies at Leamington, 538
Metropolitan Gas Companies, Comparative Working Results, 535, 544
Metropolitan Gas Companies' Official Testing, 216
Metropolitan Gas Company of Melbourne, 254, 822
Mid-Southern Utility Company—
Annual Meeting, 320
Potential Investment, 142
Midland Association of Gas Engineers and Managers—
Annual Dinner, 464
Annual Meeting, 687
Presidential Address of T. H. Poulson, 670, 688
Midland Junior Gas Association—
Hind, W., Modern Gas-Heated Equipment for Industrial Drying Processes, 47
Inspection of Gas-Driven Vehicles, 694
Smith, H., Lighting-Up Verticals after Repairs, 211, 319
Southern, H., Historical Development of Furnaces, 318
Visit to British Cast-Iron Research Association, 564
Visit to Staveley Coal and Iron Company, 803
Visit to Wolseley Motor Works, 366
Milne-Watson, Sir David—
Chairman of South-Eastern Gas Corporation, 360
The Outlook for 1933, 255
Minehead Gas Light and Coke Company, 825
Mint, Royal, Extensive Applications of Gas in the, 29, 40
Morris Commercial Cars, Ltd.—
Range of New Vehicles, 695
Silent-Third Truck and Van, 201
Municipal Housing Estates—
A Pampered Industry—"Daily Mail's" Comments, 258
Unfair Discrimination at Brighton, 609
Musgrave, J. L., Heating in the Future, 684

Napier, J. W., Solid Smokeless Fuel, 264
Narborough, Blaby, Enderby, and Whetstone Gas Company, 700
National Benzole Association, Inhibitor Process, 137
National Gas Council—
Central Executive Board Meetings, 139, 360, 742
Joint Conference of National Bodies, 356
National Institute of Industrial Psychology, Psychology of the Canvasser, 739
National Smoke Abatement Society—
An Outrageous Proposal, 465
Classes for Stokers, 141
Fumifugium, 365
Scheme for Further Regional Committees, 33
National Union of Manufacturers, Red Book, 540
National Wages Board for Railways, 137
Nellissen Gas Detector, 695
Neunkirchen Gasholder Explosion, 361, 356, 456, 460, 535, 536, 611
Newcastle-upon-Tyne and Gateshead Gas Company—
Annual Meeting, 571
Double Fatality, 258
Explosion at Gateshead, 801
Gas-Driven Buses, 308
Sales Methods, 194
Travelling Showroom, 800
Newmarket Gas Company, 700
Newport (Mon.) Gas Company, 762
Newton Abbot Gas Company, Employees' Dinner, 672
Nichols Compressors, Ltd., Distribution Agreement, 640
North Middlesex Gas Company, 700
Northampton Gaslight Company, 35
Northwich Gas Company, 825

Obituary—
Appleton, T. H., 672
Bruce, D. D., 138, 193
Curtis, J., 138
Darby, E., 89
Duffield, W. W., 30
Eddy, W. D., 30
Ellis, Mrs. J. H., 559
Harris, J. A., 800
Jennings, Mrs. A. L., 253
Lambert, J., 736
Layton, W. T., 358
Livingston, R. E., 736
McGillivray, J., 193
Pickard, H., 193
Procter, A., 358
Rice, R. G., 138
Smith, Mrs., 800
Whisson, A. W., 736
Wilkinson, J., 253
Wilson, J. W., 30
Younger, W., 138
Oil—
Domestic Piping, 799
Versus Coal, 799
Oldham Gas Department—
Demolition of Higginshaw Works, 139
Exhibition, 801
Osterrieth, J. W., Production of Organic Compounds from Coke Oven Gas, 202
Oxford and District Gas Company—
Annual Meeting, 700
New Scale of Charges, 801

Parkinson & Cowan, Ltd., 54
Parkinson, W., & Co., Gas Measurement Apparatus, 749
Parkinson Stove Co., Ltd.—
Australian Branch Display, 39
B.I.F. Booklet, 538
Penrith Gas Department, New Holder Inaugurated, 32
Personal—
Adams, A. E., 304
Alexander, J. R. W., 606
Anderson, W., 358
Armitage, T. B., 305
Bencraft, Sir R., 606
Betley, F., 458
Brooks, E. G., 458
Buckley, J. W., 304
Buckley, Lieut.-Col. A., 253
Carpenter, Dr. C., 672
Caton, W. E., 800
Chapman, W. C., 30
Clark, G., 537
Clayton, Dr. G. C., 89
Cohen, H. T., 192
Coleman, T., 30
Conway, T. B., 138
Davey, J. G., 253
Daw, J. E., 606
Dunn, W. T., 138
Falk, M., 88
Falkner, J. M., 30
Field, E., 537
Fletcher, Mr. and Mrs. H., 192
Gledhill, W. M., 89
Goodenough, Sir Francis, 30, 88, 89, 138, 192, 358
Griffiths, D. E. G., 138
Grizzell, E. T., 138
Hack, T. H., 138
Hill, W., 192
Johns, W. H. T., 304
Johnson, C., 305
Jones, F. H., 672
Kellett, J., 800
Lewis, T. T., 88
McLusky, W. B., Jnr., 458

Personal—(*continued*)
Mercer, G. C., 30
Mitchell, J., 304
Nadin, J. G., 138
Nielsen, H., 800
Platt, F., 537
Restall, R. J., 192
Richardson, R. T., 672
Richmond, T. E., 606
Rowan, T. A., 358
Sellié, A., 606
Simpson, R. T., 253
Smith, R. W., 736
Stewart, W. A. M., 800
Waddington, J., 192
Whimster, T. C., 253
Wilson, J. W., 606
Perth Gas Department—
Lighting of Curling Rink, 616
Results, 391
Piggott, Thomas, & Co., Ltd., Contract for Klönne Holder, 54
Pirie, H. L., Combustion of Solid, Liquid, and Gaseous Industrial Fuels, 96
Plymouth and Stonehouse Gas Light and Coke Company—
Catering Demonstrations, 538
Clubroom Opened, 193
K.C.U. Push, 812
New Holder, 613
Plymouth Gas Department, Price Reduction, 608
Poland, Gas Production in, 359
Pollution, River and Industrial Effluent, 542
Population Expert, The, 304
Portland Gas Department, Unremunerative Consumers, 253
Portsmouth Gas Company—
Annual Meeting, 571
Dividends, 359
Poulson, T. H., Presidential Address before the Midland Association of Gas Engineers, 670, 688
Pratt, D. A., Why not a Women's Gas Association? 537
Producer Gas, Combustion of, 537
Publicity, in Sheffield, 32
Pudsey Gas Company, 700

Radiation Limited—
Annual Meeting, 757
Floodlighting of Stand at B.I.F., 538
Ramsey Gas Light Company, 738
Rare Earth Concentrates, Registration of, 139
Rates—
Decrease, 29
Rate Structure as a Business Builder, 191, 208
Woodbridge, G. W., on Gas, 191, 206
Rating, Appeals and Official Practice, 192
Reading Gas Company, 700
Reavell & Co., Vertical Air Compressors, 321
Rees, E., Address to Wandsworth Rotary Club, 253
Refractory Materials, in Vertical Retorts, 137, 146, 458, 459
Rembrandt Photogravure, Ltd., Modern Commercial Photogravure, 540
Renold and Coventry Chain Co., Ltd., Stock Chain Drives, 154
Retorts, Control of Bench Vacuum, 537
Retorts, Vertical—
Carbonization with 103-in., 303, 316
Control of Bench Vacuum, 149
Lighting-up after Repairs, 211, 319
Operation of, 256
Rhead, F. A., Carbonization with 103-in. Vertical Retorts, 316
Richbell, P., Notes on Distribution, 468, 562
Richmonds Gas Stove Company, Ltd., Displays, 35, 541
Roberts, L. W., Combustion of Producer Gas, 537
Robson, J. L., Welfare Planning for Progress, 42
Rochester, Chatham, and Gillingham Gas Company, 639
Romford Gas Company—
Price Reduction, 193
Results, 700
Ross, R. S., Floodlighting of Building Estates, 804
Rotherham Gas Department—
Advertising Film, 200
Revised Tariff, 140, 197, 200, 202, 365
Royal Sanitary Institute, Forthcoming Congress at Blackpool, 90
Royal Society of Arts, Competition of Industrial Designs, 463
Russia, U.S.S.R. in Construction, 140
Rustproofing, in Canada, 739

St. Ives (Cornwall) Gas Department, Inauguration of "W.D." Installation, 140
Salesmanship, in the Fuel Industries, 624
Salford Transport Department, Experiments with Creosote as Motor Fuel, 369
Scarborough Gas Department—
Cookery Demonstrations, 800
Results, 639
Scottish Coal Products, Ltd., Failure of, 308
Scottish Junior Gas Association (Eastern District)—
Gardner, D., Water Softening and Boiler Practice, 52
Masterton, W., A New Automatic Cut-Off for Calorimeters, 51
Visit to Auchengeich Coke Ovens, 465
Scottish Junior Gas Association (Joint Meetings), Address by C. Valon Bennett, 144
Scottish Junior Gas Association (Western District)—
Anderson, A. R., Tar and Liquor Separator, 148
Campbell, W., Control of Retort Bench Vacuum, 149
Sturrock, N. C., Coal Testing and Other Aids in the Control of Carbonization, 754
Selas Gas and Engineering Company, Ltd., 392
Sensible Heat Distillation, Ltd., Litigation, 503
Sheffield Gas Company—
Christmas Window Display, 91
Coke Oven Gas Grid, 738
Gas Kitchen Installation, 741
Ideas for Easy Home Management, 92
Lectures to Outdoor Staff, 463
Publicity and Progress, 32
Results, 762
Sheffield Illumination Society, Collett, H. H., Gas-Works Practice, 756
Shotley Bridge and District Gas Company, 700
Showroom Window Displays—
Bournemouth, 33
New York, 257
Sheffield, 91
Showrooms—
Bristol, 551
Lurgan, 539
Rayleigh, 811
Simon Carves, Ltd., Plant for Staveley, 270
Sloan, J., Lengthy Family Service, 463
Smethwick Corporation, Stand at B.I.F., 538
Smethwick Gas Department, Extension of Service, 196
Smith, H., Lighting-up Verticals after Repairs, 211, 319
Smith Meters, Ltd., "Radial" Gas Meters, 260
Smoke, When London was Smokeless, 740
Smokeless Fuel—
Lecture by E. W. L. Nicol, 542
Napier, J. W., on Solid, 252, 264
Solid, 305
Society of British Gas Industries, Council Meetings, 255, 538
Society of Chemical Industry—Glasgow Section, Napier, J. W., Solid Smokeless Fuel, 264
South-Eastern Gas Corporation, Ltd.—
Further Developments, Maidstone, Dover, and Folkestone, 32, 463, 538, 608
Sir David Milne-Watson Becomes Chairman, 360
South Metropolitan Gas Company—
Accounts, 302, 307
Annual Meeting, 382
Barge Towing Test, 740
Bill, 153, 190
Exhibit at London Section of the B.I.F., 612
Exhibit at South London Exhibition, 685
Old Kent Road "Explosion," 308
South Shields Gas Company, Annual Whist Drive and Dance, 305
South Suburban Gas Company—
Accounts, 307
Annual Meeting, 386
Bill, 153, 696, 758
Exhibit at South London Exhibition, 685
Gasworkers' Party, 368
Lighting in Northfleet, 672
South Yorkshire Gas Grid Company, Progress of, 738
Southampton Gaslight and Coke Company—
Annual Meeting, 571
Children's Party, 139
Exhibition, 744
Southern, H., Historical Development of Furnaces, 318
Southgate and District Gas Company—
Results, 700
To Supply Colney Hatch Mental Hospital, 359
Spennymoor and Tudhoe Gas Company, Acquisition of Coxhoe Company, 32
Stalybridge Gas Department, New Plant Inaugurated, 141
Stamford and St. Martins Gas Light and Coke Company—
Results, 701
Stand at Trades Exhibition, 672
Stanton Ironworks Co., Ltd.—
Comprehensive Operations, 675
Mechanical Lead Joint, 472
Statute and Case Law, Review of as Applicable to Gas Undertakings in 1932, 37
Staveley Coal and Iron Co., Ltd.,—
Visited by London and Southern District Junior Gas Association, 677
Visited by Midland Junior Gas Association, 803
Stirling Gas Light Company—
Carbonizing Results, 254
Inauguration of Glover-West Installation, 746
Negotiations for Purchase of Bridge of Allan Works, 736
Stocks and Shares (New Capital Issues)—
Altrincham, 504
Bournemouth, 736
Mid-Southern, 270, 392
Northampton, 154
Stoke-on-Trent Gas Department, Explosion, 256
Stroud Gas Light and Coke Company, Lecture on Water Heaters, 360
Sturrock, N. C., Coal Testing and Other Aids in the Control of Carbonization, 754
Sugg, William, & Co., Ltd., Public Lighting Catalogue, 464
Sulphate of Ammonia Prices, 28, 53
Sunderland Gas Company—
Opposition to Special Order, 89
Results, 701
Swadlincote Gas Department, Price Reduction, 737
Swansea Gas Light Company, 763
Sweden—
Ammonia Situation, 95
Gas Production, 32
Swiss Gas Association, Report on Gas Output, 673
Switzerland, New Works at Sion, 253

Tar—
And Liquor Separator, 148
Oil Spraying in Orchards, 620
Taxation, Cases in the Courts, 671
Tenby Gas Consumers' Company, Special Order, 826
Ternes, A. O., Experiences of Silica in Continuous Vertical Plant, 146
Threlfall, C. R. F., Refractories for Verticals, 459
Tiverton Gas Department, Price Reduction, 139
Tottenham and District Gas Company—
Annual Meeting, 569
Dividends, 359
Edmonton Lighting, 608
Ponders End Lighting, 306
Report, 381
Trade Barometer, 136
Trade Journals, Some Early Contemporaries, 90
Trade Marks Committee, 464
Tully, Sons, & Co., Ltd., Plant for Goring and Grantham, 392
Tunbridge Wells Gas Company, 701

Ulverston Gas Department, 35
Underfeed Stoker Company, Mechanical Handling Equipment, 95
United Water Softeners, Ltd., Works Extensions, 34

Valon, A., Spending for Efficiency, 607
Vertical Gas Retort Syndicate, Ltd., "Simplex" Water Gas Plant, 89, 578
Viney, W. J., Why Not a Women's Gas Association? 672
Vulcan Stove Company, Cookery Book, 541

Wakefield Gaslight Company, 825
Wales and Monmouthshire Junior Gas Association, Howells, A. D., Application of Gas to the Tinplate and Sheet Industries, 313
Wallasey Gas Department—
Carbonization with 103 In. Verticals, 303, 316
Fixing of Geysers in Bathrooms, 360
Gas Service, 306
Special Order, 640
Walsall Gas Department, Application to Borrow, 139
Wandsworth and District Gas Company—
Annual Meeting, 632
Floodlighting of Building Estates, 804
Rapid Development, 33
Report, 464
Warrington Gas Department—
Extension of Cheshire Trunk Main, 139
Success of Exhibition, 672
Water Gas, Aspects of Manufacture, 565
Water Gas Plant, "Simplex," 89
Water Softening and Boiler Practice, 52
Watford and St. Albans Gas Company—
Potential Investment, 142
Results, 702
Watson House, Visited by Illuminating Engineering Society, 145
Wearing, C. M., Theoretical Aspects of Benzole Recovery, 750, 814
Welfare, Planning for Progress, 42
Wellington (N.Z.) Gas Company, 822
Wellington Tube Works, Ltd., 257
Western Junior Gas Association—
Copp, D. L., Coke Handling Plant, 376
Davies, E. S., Gas in Industry, 98
Westminster Technical Institute, Opening of Extension, 473
West's Gas Improvement Company, Ltd.—
Copenhagen Contract, 675
Glover-West Installations in Hand, 803
West's Rotinoff Piling and Construction Company, Ltd., Shell Pile, 43
Weymouth Consumers' Gas Company, 269

Whessoe Foundry and Engineering Company, "Fenilic" System of Heating, 543
Whitby Gas Company, 763
Widnes Gas Department, Record Sale of Appliances, 193
Willey & Co., Ltd., Holder for Bideford, 764
Winchester Water and Gas Company, 825
Wolverhampton Gas Company, 701
Women's Gas Association, 672
Wood, J. W., Review of "Gas Calorimetry," 36
Woodall-Duckham Vertical Retort and Oven Construction Co. (1920), Ltd., Clacton Installation, 806
Woodbridge, G. W., Gas Rates, 206
World Power Conference, Papers to be Read, 305
Wright, G., Lecture to Engineering Society, 672

York Gas Company, 639
Yorkshire Junior Gas Association—
Bradbury, J., Gas in the Wire Drawing Industry, 199, 263
Dent, F. J., Aspects of Water Gas Manufacture, 565
Visit to York, 802
Yorktown (Camberley) and District Gas and Electricity Company, 216, 267

LEGAL INTELLIGENCE.

Accident on Thames, 269
Infringement of "Coalite" Trade Mark, 825
Litigation Between Sensible Heat Distillation, Ltd., and British Coal Distillation, Ltd., 503
Low Temperature Carbonisation, Ltd., *v.* Barlow Coal Company, Ltd., 631

CORRESPONDENCE.

Combustion of Producer Gas—Roberts, L. W., 537
Continuous Meter Reading and Billing—
Carmichael, T., 359
Carr, W. M., 30
Control of Retort Bench Vacuum—Downs, F. S., 537
Gas for Commercial and Industrial Purposes—Bloor, H. E., 607
Neunkirchen Gasholder Explosion—
Blakeley, W., 536
Carpenter, Dr. C., 536
"Pro Bono Publico," 536
"Safety First," 536
Opening of the Garston Holder—Cleland, A. M'I., 305
Refractories for Verticals—Threlfall, C. R. F., 459
"Simplex" Water Gas Plant—Vertical Gas Retort Syndicate, Ltd., 89
Solid Smokeless Fuel—Helps, G., 305
Spending for Efficiency—Valon, A., 607
Why Not a Women's Gas Association?—
Pratt, D. A., 537
Viney, W. J., 672

Blakeley, W.—Neunkirchen Gasholder Explosion, 536
Bloor, H. E.—Gas for Commercial and Industrial Purposes, 607
Carmichael, T.—Continuous Meter Reading and Billing, 359
Carpenter, Dr. C.—Neunkirchen Gasholder Explosion, 536
Carr, W. M.—Continuous Meter Reading and Billing, 30
Cleland, A. M'I.—Opening of the Garston Holder, 305
Downs, F. S.—Control of Retort Bench Vacuum, 537
Helps, G.—Solid Smokeless Fuel, 305
Pratt, D. A.—Why Not a Women's Gas Association? 537
"Pro Bono Publico"—Neunkirchen Gasholder Explosion, 536
Roberts, L. W.—Combustion of Producer Gas, 537
"Safety First"—Neunkirchen Gasholder Explosion, 536
Threlfall, C. R. F.—Refractories for Verticals, 459
Valon, A.—Spending for Efficiency, 607
Vertical Gas Retort Syndicate, Ltd.—"Simplex" Water Gas Plant, 89
Viney, W. J.—Why Not a Women's Gas Association? 672

PARLIAMENTARY INTELLIGENCE.

Basic Price Inquiry Report, 86
Gas Legislation Committee's Work, 250
Gas Undertakings (Basic Charges) Joint Committee, 44
Private Bills and Special Orders, 53, 392, 476, 568, 631, 764, 826
Use of Gas-Works Distillate in the Navy, 53

REGISTER OF PATENTS.

Cannon Iron Foundries, Ltd., and Clayton, R. T.—Flueless Radiators, 568
Cannon Iron Foundries, Ltd., Clayton, R. T., and Benton, W. E.—Flueless Gas Fires, 152
Dempster, R. & J., Ltd., and Sheeran, A. J.—Gas Flow through Purifiers, 41
Ewart, S.—Gas Cocks, 568
Gill, G. M.—Air-Heating Gas Fires, 153
Humphreys and Glasgow, Ltd.—C.W.G. of Low Density, 268
Humphreys and Glasgow, Ltd.—Dehydration of Gas, 369
Main, R. & A., Ltd., and Wortley, G. W.—Gas Radiators, 152
Parkinson and Cowan (Gas Meters), Ltd., and Hobson, H. A.—Adjustable Lamp Reflectors, 568
Parkinson and Cowan (Gas Meters), Ltd., Cheshire, W. D., and Butterworth, E.—Gas Meters, 152
Radiation, Ltd., and Yates, H. J.—A "Gauge" Burner for Fires, 41
Russell, E.—Deflecting Plates for Ovens, 41
South Metropolitan Gas Company, Chandler, D., and Evans, E. V.—Gas Fires, 152
West, F. J., West, E., and West's Gas Improvement Company—Coke Chambers of Vertical Retorts, 268
West, F. J., West, E., and West's Gas Improvement Company—Lubricating Conveyors, 369
West, F. J., West, E., and West's Gas Improvement Company—Repairing Gas Retorts, 153
Whessoe Foundry and Engineering Co., Ltd., and Grant, A. G.—Electrical Precipitation of Tar, 41

382,660. A "Gauge" Burner for Fires—Radiation, Ltd., and Yates, H. J., 41
385,435. Adjustable Lamp Reflectors—Parkinson and Cowan (Gas Meters), Ltd., and Hobson, H. A., 568
383,436. Air-Heating Gas Fires—Gill, G. M., 153
383,041. Coke Chambers of Vertical Retorts—West, F. J., West, E., and West's Gas Improvement Company, 268
373,486. C.W.G. of Low Density—Humphreys and Glasgow, Ltd., 268
382,115. Deflecting Plates for Ovens—Russell, E., 41
384,190. Dehydration of Gas—Humphreys and Glasgow, Ltd., 369
380,890. 381,631. Electrical Precipitation of Tar—Whessoe Foundry and Engineering Co., Ltd., and Grant, A. G., 41
381,701. Flueless Gas-Fires—Cannon Iron Foundries, Ltd., Clayton, R. T., and Benton, W. E., 152
380,917. Flueless Radiators—Cannon Iron Foundries, Ltd., and Clayton, R. T., 568
381,468. Gas Cocks—Ewart, S., 568
380,352. Gas Fires—South Metropolitan Gas Company, Chandler, D., and Evans, E. V., 152
382,578. Gas Flow through Purifiers—R. & J. Dempster, Ltd., and Sheeran, A. J., 41
379,467. Gas Meters—Parkinson and Cowan (Gas Meters), Ltd., Cheshire, W. D., and Butterworth, E., 152
380,439. Gas Radiators—R. & A. Main, Ltd., and Wortley, G. W., 152
385,063. Lubricating Conveyors—West, F. J., West, E., and West's Gas Improvement Company, 369
382,425. Repairing Gas Retorts—West, F. J., West, E., and West's Gas Improvement Company, 153

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